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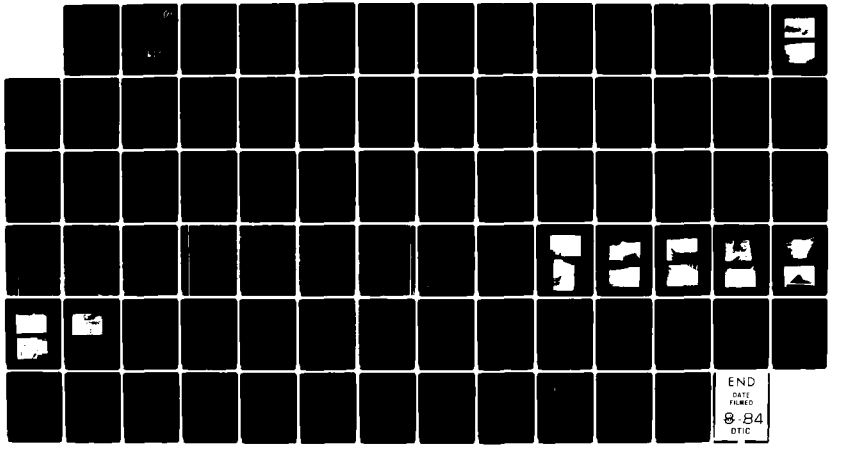

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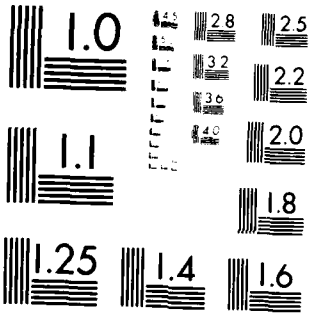

THAMES RIVER BASIN
THOMPSON, CONNECTICUT

NORTH GROSVENORDALE POND DAM

CT 00183

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JUNE 1979

NORTH GROSVENORDALE POND DAM

CT 00183

THAMES RIVER BASIN
THOMPSON, CONNECTICUT

PHASE I INSPECTION REPORT
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UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00183	2. GOVT ACCESSION NO. AH3311	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) North Grosvenordale Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE June 1979 13. NUMBER OF PAGES 45
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Thames River Basin
Thompson, Conn.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

North Grosvenordale Pond Dam is a compositemasonry and earth dam consisting of two downstream stepped, ashlar faced masonry overflow sections, a granite block and earth fill right abutment and an earthfill dike on the left abutment. The entire length of the dam is about 2,400 ft. The dam is judged to be in fair condition. The height of the dam is 22.5 ft:the size classification is thus small.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:

NEDED

SEP 24 1979

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

I am forwarding to you a copy of the North Grosvenordale Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Gansett Company, 75 Savin Street, Pawtucket, R.I..

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No.:	CT 00183
Name of Dam:	North Grosvenordale Pond Dam
Town:	Thompson
County and State:	Windham County, Connecticut
Stream:	French River
Date of Inspection:	5 April & 10 May 1979

BRIEF ASSESSMENT

North Grosvenordale Pond Dam is a composite masonry and earth dam consisting of two downstream stepped, ashlar faced masonry overflow sections, a granite block and earth fill right abutment and an earthfill dike on the left abutment. The entire length of the dam is about 2,400 ft. It is a run-of-the-river dam which once served the industrial needs of a downstream mill. Outflows through the millrace are now used for fire protection of the mill.

North Grosvenordale Pond is about 1.5 miles long and has a surface area at spillway level of about 60 acres. The drainage area above the dam is about 99 sq. mi. and the maximum storage to the top of dam is estimated at about 840 acre-ft. The height of the dam is 22.5 ft.; the size classification is thus small. A breach of the dam would affect more than a few homes and cause extensive community and industrial economic loss, with the possibility of some loss of life. The Penn Central Railroad and three roads would be affected by the high water. The dam has been classified as having a high hazard potential.

The dam is judged to be in generally fair condition. At the time of the inspections, water was flowing over the right spillway, so that it was not possible to observe the condition of the downstream ashlar face, or to determine whether there is any erosion at the toe of the spillways. The crest of the left spillway is higher than the right spillway. The difference is less than 6 in. The sluiceway through the left spillway is inoperative. Some of the left spillway stones have been dislodged and displaced. Several joints in the training walls are in need of repointing. The bridges over the spillways are in a deteriorating condition. Tree and brush growth is abundant along the left abutment dike.

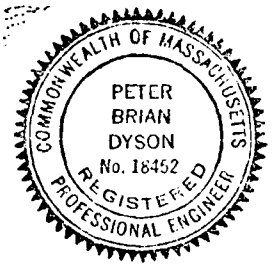
The spillways are not adequate to pass the ½ PMP test flood of 25,400 cfs without overtopping the non-overflow sections of the dam. The test flood would overtop the dike by about 2.2 ft. The spillway can pass 4,950 cfs or about 20 percent of the test flood without overtopping the dike, elevation 375.4 MSL.

Within one year after receipt of this Phase I Inspection Report, the owner, the Gansett Company, should retain the services of a registered professional engineer and implement the results of his evaluation of the following: (1) a plan to remove trees and shrubs from the dike, including their root systems;

(2) assess further the potential for overtopping and the inadequacy of the spillways including the use of stoplogs; (3) inspect the right spillway and sluiceway during periods of low or no flow conditions; (4) whether repairs are needed along the downstream face of the spillways or in the riverbed at the toe of the spillways; and (5) whether the sluice on the left spillway should be repaired or plugged.

The owner should also implement the following operating and maintenance measures: (1) repair concrete on the west abutment; (2) point masonry walls where needed; (3) repair bridges over spillways; (4) remove tree from masonry wall on center island; (5) stoplogs should not be installed until all the above recommendations and all other remedial measures have been implemented; (6) develop a formal surveillance and flood warning plans; and (7) institute procedures for an annual periodic technical inspection.

Peter B. Dyson
Project Manager



This Phase I Inspection Report on North Grosvenordale Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

JOSEPH A. MCELROY, CHAIRMAN
Chief, NED Materials Testing Lab.
Foundations & Materials Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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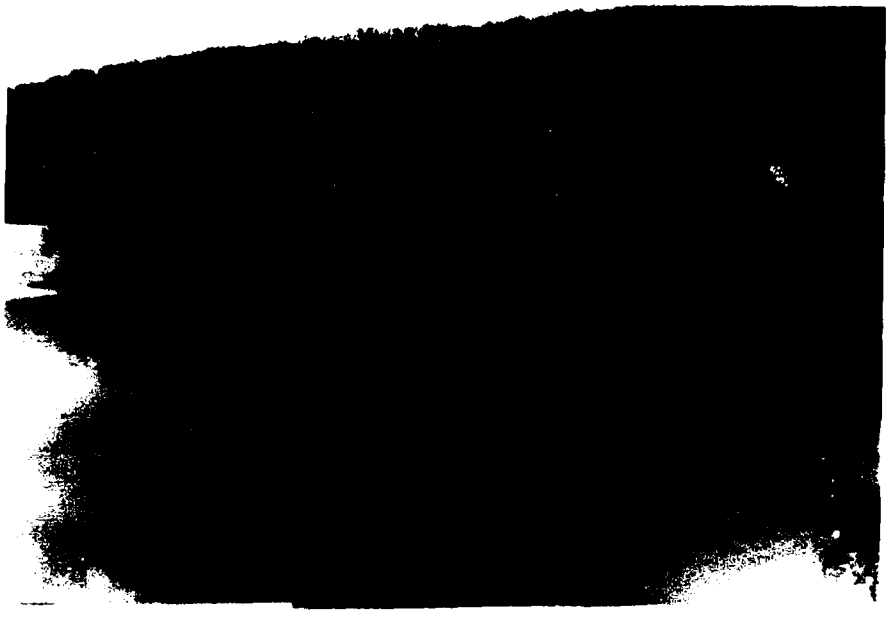
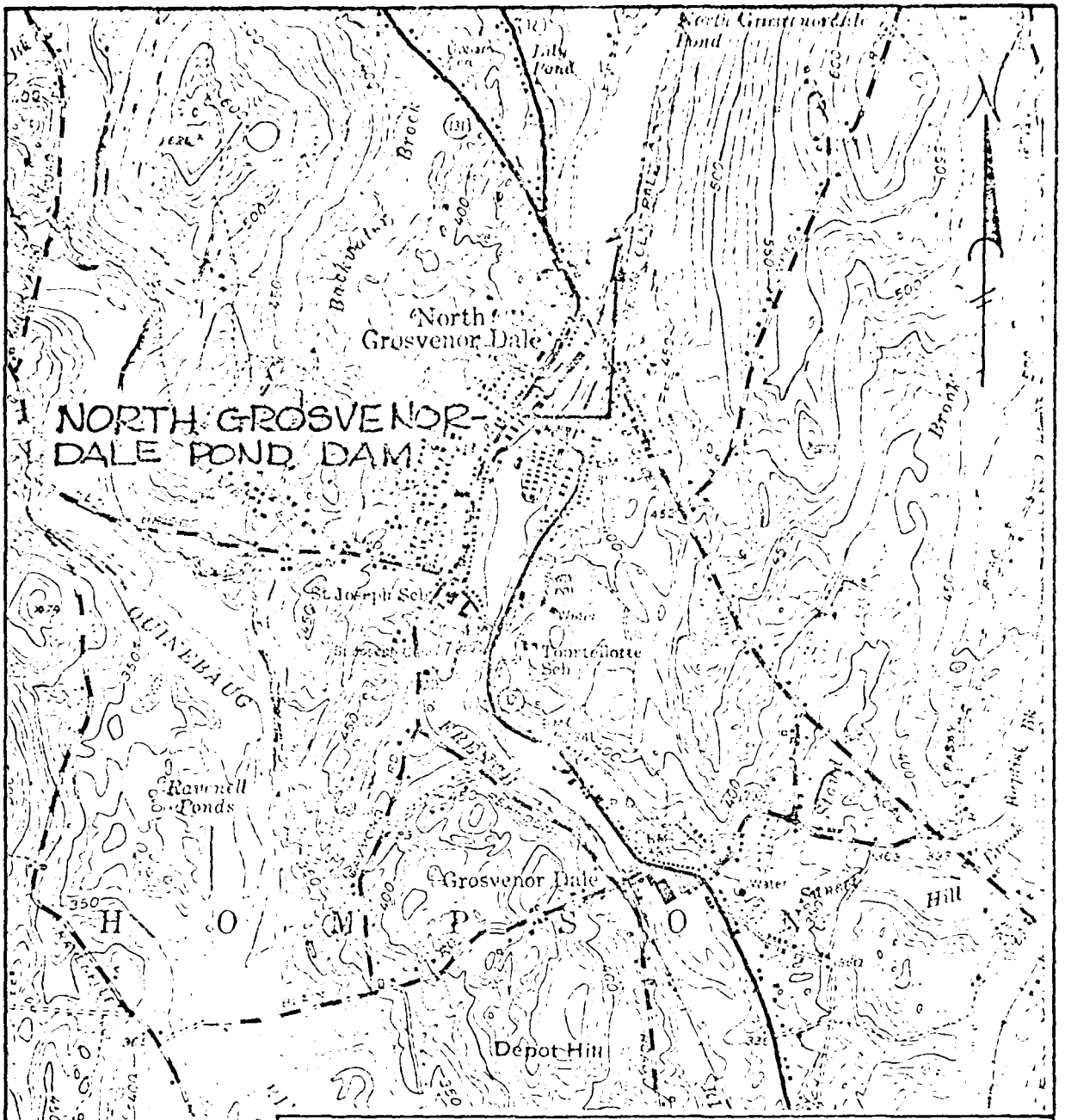
Overview from Left Abutment



Overview from Right Abutment


NORTH GROSVENOR-
DALE POND DAM
North Grosvenordale
Pond
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AQUILEBAUG
Ravenell
Ponds
Grosvenor Dale
Depot Hill
Stony
Hill
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WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
NORTH GROSVENORDALE POND DAM
PUTNAM QUADRANGLE
THAMES RIVER BASIN
STATE - CT.
SCALE
DATE

PHASE I INSPECTION REPORT

NORTH GROSVENORDALE POND DAM CT 00183

Section 1 - PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of Dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Louis Berger & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to Louis Berger & Associates, Inc. under a letter of 19 March 1979 from John P. Chandler, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0051 has been assigned by the Corps of Engineers for this work.

b. Purpose.

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. North Grosvendordale Pond Dam is located on the French River about 4.5 miles upstream from the river's confluence with the Quinebaug River. The damsite is in the community of North Grosvenordale, in the town of Thompson, Windham County, Connecticut. The dam is reached via State Highway 200. It is shown on U.S.G.S. Quadrangle, Putnam, Connecticut with coordinates approximately at N41° 59' 30", W 71° 53' 45".

b. Description of Dam and Appurtenances. North Grosvenordale Pond Dam is a run-of-the-river dam believed to have been constructed around 1900 as a diversion dam to serve a downstream mill complex.

Essentially the dam consists of two overflow masonry gravity sections separated by a non-overflow earth fill island, a masonry gate structure at the head of the diversion canal on the right (westerly) abutment and an earth dike on the left (easterly) abutment. The right overflow section is about 97 ft. long and the left overflow section is about 100 ft. long. The overall length of the dam including the left abutment dike is about 2,380 ft., of which the dike accounts for 2,000 ft. The overflow sections

(spillways) are constructed of ashlar faced masonry. Channel stoplog guides are spaced at about 6.5 ft. intervals along the crest of each spillway. At the time of the inspection there were no stoplogs installed. Wooden planked catwalks constructed about 4.5 ft. above each spillway connect the left and right abutments to the island. The gate structure in the right abutment serves as an entrance to a diversion canal and raceway leading to a mill that is located about 1,700 ft. downstream. The gate structure which is deteriorated and inoperative has four bays with an overall width of about 36 ft. The earth dike on the left abutment runs essentially northerly parallel to the Penn Central Railroad which is located approximately 100 ft. downstream of the toe of the dike. (See Appendix B for a sketch of the dam.)

The crest of the left spillway is higher than the right spillway. The exact difference was not determined in the field but it is less than 6 in. For the purposes of this report, this difference was neglected and both spillway crests assumed to be at 371.0 MSL as shown in the USGS Quadrangle for Putnam, Ct.

c. Size Classification. North Grosvernordale Pond Dam is about 22 ft. high, and impounds a normal storage of about 540 acre-feet to spillway crest level and a maximum of about 840 acre-feet to the top of dike. In accordance with the size and capacity criteria given in Recommended Guidelines for Safety Inspection of Dams, the project falls into the small category for both criteria and is therefore classified accordingly.

d. Hazard Classification. The French River below North Grosvenordale Dam passes through the community of North Grosvernordale. The Penn Central Railroad parallels in close proximity to the easterly side of the river as it passes the pond, the dam, and through the community of North Grosvernordale. About 1.5 miles downstream of the dam the railroad crosses the river and then follows its westerly bank. State Highway 200 crosses the river about 1,200 ft. downstream of the dam. Two other local roads traverse the river within the area of potential flooding. There are several industrial buildings and more than 40 homes located within this river reach. Below the community of Grosvenordale, which is located 1.7 miles downstream of the dam, the river traverses through a wider valley where it is expected that a flood stage caused by a breach of the dam would be considerably reduced from that prevailing in the reach between the dam and Grosvenordale.

The river section for about one-half mile downstream is in a rather narrow confined channel. A breach failure of the dam when the water level in the pond was at top of dike would release a sudden flood wave, raising the downstream stage of about 9 ft. to a stage of as much as 18 ft.

Such a sudden breach of the dam would cause the loss of more than a few lives and result in extensive community damage and industrial economic losses. Consequently, North Grosvenordale Pond Dam has been classified as having a high hazard potential in accordance with the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership. North Grosvenordale Dam is owned by the Gansett Company, 75 Savin Street, Pawtucket, R.I.

The Dam is believed to have been constructed in 1900 by the owners of the mill downstream for use in their textile milling operation. The dam is also known by its popular name: Cluett Peabody Dam.

f. Operator. Mr. Tony Judd, Plant Manager, Gansett Company, Thompson, Connecticut. Telephone: (203) 923-2154.

g. Purpose of Dam. The dam was originally constructed to create industrial water storage for the mill located just downstream. At the present time the reservoir is only utilized for fire protection of the same mill site.

h. Design and Construction History. It is not known by whom the dam was constructed; no drawings or reports have been found. The construction is of ashlar masonry, which has been out of vogue since the turn of the century. This tends to confirm the estimated 1900 year of construction.

i. Normal Operating Procedure. There are no operational procedures for North Grosvenordale Pond Dam.

1.3 Pertinent Data

a Drainage Area. The drainage area above North Grosvenordale Pond Dam consists of about 99 sq. mi. described in general as rolling terrain. Most of the drainage area is forested. It contains numerous mill ponds, lakes and reservoirs, the largest body of water being Lake Chaubunagungamaug located about 7.2 miles upstream of the North Grosvenordale Pond Dam. The drainage area is about 21 miles long and 8 miles wide at its widest point. There are also two U. S. Army Corps of Engineers flood control dams within this 99 sq. mi. drainage area. Hodges Village has a drainage area of 31.1 sq. mi. and Buffumville has a drainage area of 26.5 sq. mi.

b. Discharge at Damsite.

(1) Outlet Works Conduit. None

(2) Maximum Known Flood at Damsite. The maximum discharge at the damsite is unknown. However, the maximum discharge at U.S.G.S. Station 01125000 located about 4.7 miles upstream at Webster, Mass., having a period of record from 1948 to present, was 14,400 cu. ft./sec. on August 19, 1955.

(3) Ungated Spillway Capacity at Top of Dam. The total spillway capacity at top of dike, elevation 375.4, is 4,950 cfs.

(4) Ungated Spillway Capacity at Test Flood Elevation. The ungated spillway capacity is about 8,950 cfs at test flood elevation 377.6

(5) Gated Spillway Capacity at Normal Pool Elevation. Not applicable.

(6) Gated Spillway Capacity at Test Flood Elevation. Not applicable.

(7) Total Spillway Capacity at Test Flood Elevation. The total spillway capacity at the test flood elevation is 8,950 cfs at elevation 377.6.

(8) Total Project Discharge at Test Flood Elevation. The total project discharge at test flood is 25,400 cfs at elevation 377.6.

c. Elevations (Ft. above MSL)

(1) Streambed at centerline of dam - 352.9

(2) Maximum tailwater - Not computed

(3) Upstream invert of outlet culvert - Not applicable

(4) Recreation Pool - Not applicable

(5) Full flood control pool - Not applicable

(6) Ungated spillway crest - Right spillway - 371(±) (from USGS Quad Sheet)
Left spillway - 371.3 (estimated, not determined in field)

(7) Design surcharge (original design) - Unknown

(8) Top of Dam - Dike varies from 375.4 to 376.6
Right Abutment - 376.0
Left Abutment - 375.6
Center Island - 375.6

(9) Test flood design surcharge - 379.1

d. Reservoir

(1) Length of maximum pool - 7,200(±) ft.

(2) Length of recreation pool - Not applicable

(3) Length of flood control pool - Not applicable

e. Storage (acre-ft.)

(1) Recreation pool - Not applicable

(2) Flood control pool - Not applicable

(3) Spillway crest pool El. 371.0 - 540

(4) Top of dike El. 375.4 - 840

(5) Test flood pool El. 377.6 - 1,050

f. Reservoir Surface (acres)

(1) Recreation pool - Not applicable

(2) Flood control pool - Not applicable

(3) Spillway crest El. 371.0 - 60.0

(4) Top of dike El. 375.4 - 76.5

(5) Test flood pool El. 377.6 - 89.5

g. Dam

(1) Type - Gravity Ashlar masonry overflow section with downstream stepped section and upstream timber covered earthfill; earth dike.

(2) Length - 2,380 ft.

(3) Height - 22.5 ft.

(4) Top width - Varies

(5) Side slopes - Upstream unknown
Downstream 1 horizontal to 1 vertical, stepped section; dike, variable.

(6) Zoning - Not applicable

(7) Impervious core - Not applicable

(8) Cutoff - Unknown

(9) Grout curtain - Unknown

h. Diversion and Regulating Tunnel - None

i. Spillway

(1) Type - Overflow gravity dam (downstream stepped face - 1 horizontal to 1 vertical)

(2) Length of weir - Lt. spillway - 100 ft. (91 ft. clear)
Rt. spillway - 97 ft. (89 ft. clear)

(3) Crest elevation - 371(±)

(4) Gates - None

(5) Upstream channel - Natural River Channel

(6) Downstream channel - Natural River Channel

j. Regulating Outlets

(1) Invert - Unknown

(2) Size - Unknown

(3) Description - Sluiceway through right end of left overflow section

(4) Control Mechanism - Missing

(5) Other - The sluiceway is wholly or partially open and inoperable.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

No data on the design of the dam or appurtenances has been recovered and probably none exists. In the course of the inspection a map of the pond was acquired and is shown in Appendix B.

2.2 Construction Data

No records or correspondence regarding construction have been found. There is a concrete overlay wall at the right end of the right spillway dated 1927, which suggests that major repair work may have been performed on the dam during that year.

2.3 Operation Data

The dam is operated by the Gansett Company. There appear to be no formal records of operation.

2.4 Evaluation of Data

a. Availability. Since no engineering data is available, it is not possible to make an assessment of the safety of the dam. The basis of the information presented in this report is principally the visual observations of the inspection team.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgement.

c. Validity. Not applicable.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

A. General. The visual inspection of North Grosvenordale Pond Dam took place on 5 April and 10 May 1979. On 5 April water was flowing about 6 in. above the spillway crest. The discharge over the spillway was about 190 cfs. On 10 May water was at about spillway crest elevation. There is a slight difference in the right and left spillway elevations as water was just passing over the right spillway and not over the left spillway. The dam was judged to be in fair condition. There was no evidence of any major problems but several items require attention (see Section 7.3).

b. Dam. The dam is a run-of-the-river dam with an overall length of about 2,400 ft. The principal elements of the dam are two masonry gravity spillways separated by an earthfill island, a masonry gate structure on the right (westerly) abutment, and an abandoned railroad embankment on the left (easterly) abutment which serves as an earthfill dike.

Starting from the right (west) abutment there is a masonry wall for a distance of approximately 64 ft. and then a deteriorated masonry gate structure having a clear opening of about 36 ft. From the left end of the gate structure a masonry rubble wall turns 90 degrees upstream (north) for a distance of 17 ft., and then turns 90 degrees parallel to the gate structure for a distance of 83 ft. where it intersects the right end of the right spillway. The right spillway extends approximately 97 ft. where it intersects a rubble masonry wall retaining an earthfill island separating the right spillway from the left spillway. The island is approximately oval in shape with the long axis pointing upstream from the left end of the right spillway for a distance of about 66 ft. The short axis of the oval is approximately 25 ft. wide and is more or less parallel to the crest of the right spillway. The left spillway turns approximately 50 degrees downstream and has a height of about 22.5 ft. and a crest length of approximately 100 ft. Its left end intersects a rubble masonry wall with mortared joints which connects to an earth dike approximately 2,000 ft. long. The earth dike runs essentially northerly parallel to the Penn Central Railroad located approximately 100 ft. downstream of the toe of the dike on the left (easterly) shoreline of the French River. (See Photo Nos. 1,2,3, and 4, Appendix C)

The masonry stone walls connecting the gate structure, overflow sections and dike were in good alignment. However, considerable deterioration of the mortar joints has occurred. It is not known to what degree mortar was placed in the joints in the original construction and to what degree mortar was added in the 1927 overlays.

The foundation underlying the masonry gravity dams is unknown. There was no visible evidence of any bedrock outcrops either along the bottom of the river downstream of the spillway or in either the east or west abutments. However, numerous boulders were noted in the east abutment natural slopes to the left of the dam. These boulders are indicative of a ground moraine or glacial till. However, whether there are any pervious granular sediments in the old stream bed and whether they were cut off is unknown.

c. Appurtenant Structures

(1) Spillways. The overflow portion of the dam is comprised of the left and right spillways, being two ashlar faced masonry gravity structures. The downstream face of each spillway is of stepped construction with a 1 horizontal to 1 vertical slope.

The general condition of the ashlar stones in the face of the spillways is fair. Some of the stones in the left spillway are not square and show signs of deterioration and displacement. (See Photo Nos. 5 and 6, Appendix C) There is an old sluiceway opening at the base of the right end of the left spillway which extends into the reservoir and was discharging water. The invert is estimated to be at elevation 353(±) MSL.

Just upstream in this vicinity, there is a sandbagged area where a small whirlpool measuring about 1 ft. in diameter was noted. The sandbagged area is the remnants of an unsuccessful attempt by the owner to repair the sluice gate. The control mechanism for the sluiceway is missing and it is assumed that the original gate is either missing, or wholly or partially open. The face of the right spillway could not be observed closely owing to the water cascading down the steps. (See Photo No. 13, Appendix C.)

Some items of minor structural distress were noted. The right training wall of the right spillway shows some loss of mortar in the joints. There is minor spalling and cavitation of the concrete wall on the upstream side on both the left and right sides of the right spillway. (See Photo Nos. 7 and 8 Appendix C.) Photograph No. 9, Appendix C shows the downstream end of the masonry wall which retains the island separating the two spillways. It should be noted that there is a tree growing on the face of the wall and that mortar is missing from the joints, particularly near the base of the wall.

It is evident that stoplogs have been fixed to the spillway crest in the past, but they were not in position at the time of the inspection. The stoplog slots which also serve as supporting structural members of the catwalks are shown in Photo No. 6, Appendix C.

The bridges over the two spillways are in a deteriorating condition. Several of the planks forming the walkway have been destroyed by vandalism. (See Photo No. 10, Appendix C.)

(2) Diversion Canal and Raceway. The upstream end of the mill race is gated with 4 gates and has a total width of 36 ft. The gates are in poor

condition having been partially destroyed by fire and are not presently operative. (See Photo Nos. 11 and 12, Appendix C.) The invert elevation of the gates is estimated to be 365(±) MSL. Downstream of the gates outflows through the diversion canal are limited by the hydraulic opening through the mill building.

(3) Dike. The general condition of the earth dike appears to be good with no evidence of potholes, sinkholes or seepage. However, there is considerable tree growth on the dike, both on the upstream and downstream slopes as well as on the crest. There is a dry masonry wall extending from the left end of the left spillway to the south end of the dike. This wall serves to retain the end of the earth dike. The wall's stones are square and the alignment is quite good. The Penn Central Railroad is located parallel to and just east of the dike.

d. Reservoir Area. The reservoir is a ponding of the French River. About 1.6 miles upstream of North Grosvenordale Pond Dam there is another old dam, which forms the upstream boundary of the reservoir. The shoreline around the reservoir both on the left and right is stable with no evidence of slides, movement of trees, or other deterioration.

e. Downstream Channel. Immediately downstream of the right spillway are remnants of a rock filled timber crib apron. Beyond the dam the channel is a natural river channel.

There is no evidence of any bedrock outcrops along the bottom of the river downstream of the spillway. Flows over the dam discharge into a rather narrow channel which parallels the Penn Central railroad. About 2,800 ft. downstream the river passes through the center of the community of North Grosvenordale. The French River joins the Quinebaug River 4 miles further downstream.

3.2 Evaluation

The visual inspection of the dam adequately revealed key characteristics as they may relate to its stability and integrity, permitting an assessment to be made of those features affecting the safety of the structure. The North Grosvenordale Pond Dam and appurtenant works are judged to be in generally fair condition. The dewatering facilities are inoperative. There is minor spalling and cavitation of the concrete walls. Some of the ashlar stones in the face of the left spillway are not square and show signs of deterioration and displacement. There is considerable tree growth on the dike, both on the upstream and downstream slopes as well as on the crest.

SECTION 4 - *OPERATIONAL PROCEDURES*

4.1 Procedures

The Gansett Company is the owner and operator of the dam. There are no operating devices in working order nor any documented operating procedures for the dam.

4.2 Maintenance of Dam

There is no specific maintenance program in effect at North Grosvenordale Pond Dam.

4.3 Maintenance of Operating Facilities

No specific maintenance program is in effect. Both the sluiceway in the left spillway and the gates at the head of the diversion canal and raceway are completely inoperable.

4.4 Description of any Warning System in Effect

No warning system is in effect at North Grosvenordale Pond Dam.

4.5 Evaluation

The diverted water is now used only as an emergency source for fire fighting purposes. Maintenance involves periodic growth removal from the dike and island, surveillance regarding seeps, repair of ashlar masonry and keeping the spillway crests clear of debris. The owner should establish a formal warning system.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General. The North Grosvenordale Pond Dam is a run-of-the-river type project, originally constructed to furnish the water needs of the mill located downstream of the dam. Its only use now is to provide water storage for fire portection of the mill. It is basically a low storage-high spillage dam. It consist of an ashlar masonry overflow dam and an earth fill dike.

b. Design Data. No hydrologic or hydraulic design data were retrieved for North Grosvenordale Pond Dam.

c. Experience Data. No records are available in regard to past operation of the dam or of surcharge encroachments and outflows through the spillway. However, there is a U.S.G.S. Gaging Station located about 4.7 miles upstream having a period of record dating back to December, 1948. The discharge of record at this gage is 14,400 cfs occurring on August 19, 1955. The drainage area for the gage is 85.3 sq. mi. compared with a drainage area above North Grosvenordale Pond Dam of 98.9 sq. mi.

d. Visual Observations. No evidence which would indicate possible high flows through the reservoir area or in the downstream channel were noted.

e. Test Flood Analysis. North Grosvenordale Pond Dam is about 22.5 ft. high and impounds about 840 acrea-ft. to the top of dam; it is therefore classified as small in size. Because of downstream conditions, the hazard potential is classified as high. In accordance with Recommended Guidelines for Safety Inspection of Dams, the recommedned test flood is one half the probable maximum flood to a full probable maximum flood (PMF). A test flood of a magnitude corresponding to ½ PMF was selected for the evaluation.

The NED March 1978 Preliminary Guidance Memorandum for Estimating Probable Discharges was used for estimating the maximum probable flood peak flow rate, which was then divided by two to arrive at the test value. Two upstream Army Corps of Engineers projects were also taken into consideration in arriving at the test value. Corps of Engineers upstream flood control storage projects are located in the basin at the Buffumville and Hodges Village flood control dams. The Buffumville project has a drainage area of 26.5 sq. mi. and the Hodges Village project has a drainage area of 31.1 sq. mi. Both of these drainage areas were deducted from the 98.9 sq. mi. of drainage area above the North Grosvenordale Pond Dam leaving a net area of 41.3 sq. mi. for computing the test flood. Based on this net drainage area the test flood discharge was determined to be about 1,230 CSM or about 25,400 cfs. Because of the high discharge and low storage capability of the impoundment above the dam, a storage-routing was not performed; the inflow-outflow disparity was considered to be insignificant.

A discharge curve for the dam was computed (see sheets D-4 thru D-6). With the reservoir to top of dike (elevation 375.4) the spillway can release about 4,950 cfs or about 20 percent of the test flood. The overflow portion

of the dam will not pass the test flood without an overtopping of the non-overflow sections and the dike. The water depth over the top of the dike would be about 2.25 ft. for the test flood, and the discharge over the spillway would be 9,400 cfs or 37 percent of the test flood.

f. Dam Failure Analysis. A dam failure analysis has been made for two conditions as listed below. Outflows through the sluiceway and diversion canal were not considered for flood routing purposes.

Condition 1. Failure of the Dike when Headwater Pond is at Elevation 376.0 MSL

If the dike was partially washed away for a width assumed to be 500 ft. and down to its toe for an assumed depth of 7 ft., about 15,500 cfs would be released. At pond elevation 376 ft. which is 0.6 ft. above the low point of the dike about 6000 cfs would also be passing over the spillway, yielding a river stage of about 8.5 ft. above river bottom. After the breach, the total flow of 21,600 cfs would produce a stage of about 18 ft. or a sudden rise of 9.5 ft. River valley routing downstream would produce discharges and river stages as shown on the following page.

Condition 2. Failure of Main Overflow Section with Pond at Elevation 376.0 MSL

If the main overflow sections of the dam were to fail for 40 percent of its width or about 80 ft. and to a depth down to the toe of the dam a sudden surge of about 11,500 cfs, in addition to the normal flow of 6,000 cfs over the spillway, would be released into the downstream channel. This outflow would diminish as the upstream pond gradually empties into the downstream river valley channel. After the breach, the total flow of 17,500 cfs would produce a stage of about 16 ft. or a sudden rise of about 8 ft. River Valley routings downstream would produce discharges and river stages as shown on the following page.

The most significant area impacted as a result of a breach of the dam or dike would be an area extending downstream of the dam for a distance of about 1.9 miles to the community of Grovsvenordale. Several industrial buildings and more than 40 homes in the community of North Grosvenordale would be affected as the river could rise to a stage of more than 22 ft. at the north end of the village and to about 10 ft. at the south end of the village. In addition the state highway 200 and the Penn Central Railroad bridges would be affected by a breach of the dam. Below Grosvenordale the river traverses through a wider valley where it is expected that the flood stage caused by a breach of the dam would be considerably reduced. (see Appendix D, Sheet D-20 which shows the area of potential flooding).

TABLE 1

RESULTS OF DAM FAILURE ANALYSIS

River Section	CONDITION 1				CONDITION 2			
	Pond @ Elev. 376.0 No Breaching of Structure		Pond @ Elev. 376.0 Breach of Dike		Pond @ Elev. 376.0 No Breaching of Structure		Pond @ Elev. 376.0 Breach of Main Overflow Sec.	
	Disch. cfs	River Stage Ft.	Disch. cfs	River Stage Ft.	Disch. cfs	River Stage Ft.	Disch. cfs	River Stage Ft.
Sta. 0+00 (Toe of Dam)	6,000	8.5	21,600	18	6,000	8.5	17,500	16.2
Sta. 15+00	6,000	8.5	17,400	16.1	6,000	8.5	14,600	14.9
Sta. 35+00	6,000	5.8	12,400	8.5	6,000	5.8	10,900	8.0
Sta. 53+00	6,000	7.4	9,700	9.1	6,000	7.4	8,800	8.6
Sta. 78+00	6,000	5.8	7,400	6.5	6,000	5.8	6,700	6.3

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The field investigation revealed no significant displacements or distress that would warrant the preparation of stability computations based on assumed soil properties and engineering factors. The lack of definitive data on the foundation and lack of as built drawings does not permit engineering computations based on available data. There are several items in need of attention as outlined in Section 7.3, Remedial Measures.

b. Design and Construction Data. No plans or calculations of value to a stability assessment are available for the dam.

c. Operating Records. There are no records which indicate the manner in which the dam has been operated.

d. Post Construction Changes. There are no records of any post construction changes made to the dam and dike over the course of their history. However, some of the masonry walls may have been pointed with mortar from time to time and a thin concrete overlay was placed in 1927 on the right training wall of the right spillway. There is no evidence of any changes which might adversely influence stability of the structure.

e. Seismic Stability. The dam is located in seismic Zone No. 1 and in accordance with recommended Phase I Guidelines does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. On the basis of the Phase I visual examination, North Grosvenordale Pond Dam appears to be in generally fair condition. The deficiencies revealed, however, indicate that a further investigation should be carried out and that some remedial work is needed. The major concerns with the overall integrity of the dam are as follows:

(1) The spillway will only pass about 20 percent of the ½ PMF test flood outflow.

(2) The inoperative condition of the sluice located on the right end of the left spillway and the presence of a whirlpool just upstream of the sluice.

(3) Some of the ashlar masonry blocks on the downstream face of the left spillway have been displaced. The ashlar face on the downstream side of the right spillway and the condition of the plunge pools below the dam could not be seen at the time of the inspection owing to the high flow.

b. Adequacy of Information. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency. The recommendations and remedial measures enumerated below should be implemented by the owner within one year after receipt of this Phase I Inspection Report.

d. Need for Additional Investigations. Additional investigations are required as recommended in Para. 7.2.

7.2 Recommendations

It is recommended that the owner should retain the services of a competent registered professional engineer to make investigations and studies of the following, and if proved necessary, to design appropriate remedial works.

(1) A plan to remove trees and shrubs including their root systems from the upstream and downstream slopes, and the crest of the earth dike.

(2) Make a thorough study of the hydrology of the drainage basin. Review the spillway adequacy in relation to the potential overtopping of the dike and right abutment and to the use of stoplogs.

(3) Inspect the right spillway and sluiceway during periods of low or no flow conditions.

(4) Determine whether repairs are needed along the downstream face of the spillways and in the riverbed at the toe of the dam.

(5) Determine whether the sluice in the left spillway can be made operative or whether it should be plugged.

7.3 Remedial Measures

a. Operating and Maintenance Procedures

(1) Repair deteriorated concrete on the west abutment.

(2) Point masonry walls with mortar in the right training wall of the right spillway, the masonry wall at the junction of the two spillways and other masonry walls.

(3) Repair bridges over the spillways by installing new planking and adequate support.

(4) Remove tree from masonry wall on center island.

(5) Stoplogs should not be installed until all the above recommendations and all other remedial measures have been implemented;

(6) Develop a formal flood warning plan to follow in the event of an emergency, including round-the-clock monitoring during heavy precipitation.

(7) Institute procedures for an annual periodic technical inspection of the dam and its appurtenant structures.

7.4 Alternatives

The only practical alternative would be to breach the dam under the auspices of a registered professional engineer with due consideration to environmental effects.

Appendix A

Inspection Checklist

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT North Grosvenordale Pond Dam DATE 5 April and 10 May 1979

TIME 9:00 A.M.

WEATHER Cloudy/Cool - 45°F.

W.S. ELEV. 371.5 U.S. DN.S.

PARTY:

1. Peter B. Dyson
2. Pasquale E. Corsetti
3. Roger F. Berry
4. Carl J. Hoffman
5. William S. Zoino
6. Tony Judd
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydrology	Roger F. Berry	
2.	Hydraulics/structures	Carl J. Hoffman	
3.	Soils and Geology	William S. Zoino	
4.	General Features	Peter B. Dyson	
5.	General Features	Pasquale E. Corsetti	
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT North Grosvenordale Pond Dam DATE 5 April and 10 May, 1979

PROJECT FEATURE Ashlar Masonry Dam NAME C. Hoffman

DISCIPLINE Structures NAME

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	371.0 MSL
Current Pool Elevation	0.5 ft. above crest
Maximum Impoundment to Date	Not known
Surface Cracks	None evident
Pavement Condition	Not applicable
Movement or Settlement of Crest	None evident
Lateral Movement	None visible
Vertical Alignment	Appears good
Horizontal Alignment	Appears good
Condition at Abutment and at Concrete Structures	Fair
Indications of Movement of Structural Items on Slopes	Movement of stones on downstream face of right spillway - left spillway not visible.
Trespassing on Slopes	None evident
Sloughing or Erosion of Slopes or Abutments	None evident
Rock Slope Protection - Riprap Failures	Not applicable
Unusual Movement or Cracking at or near Toes	Inaccessible, could not be observed
Unusual Embankment or Downstream Seepage	None evident
Piping or Boils	None evident
Foundation Drainage Features	None evident
Toe Drains	None evident
Instrumentation System	None evident

PERIODIC INSPECTION CHECKLIST

PROJECT North Grosvenordale Pond Dam DATE 5 April and 10 May 1979

PROJECT FEATURE Earth Dike NAME

DISCIPLINE Earth Dike NAME William Zoino

AREA EVALUATED	CONDITIONS
DIKE EMBANKMENT	
Crest Elevation	375.4 MSL
Current Pool Elevation	371.5 MSL
Maximum Impoundment to Date	Not known
Surface Cracks	None evident
Pavement Condition	Not applicable
Movement or Settlement of Crest	Minor, crest not level, varies from 375.4 to 376.6
Lateral Movement	None evident
Vertical Alignment	Fair
Horizontal Alignment	Fair
Condition at Abutment and at Concrete Structures	Not applicable
Indications of Movement of Structural Items on Slopes	Not applicable
Trespassing on Slopes	None evident
Sloughing or Erosion of Slopes or Abutments	Minor, local on downstream face.
Rock Slope Protection - Riprap Failures	Not applicable
Unusual Movement or Cracking at or near Toes	None evident
Unusual Embankment or Downstream Seepage	None evident
Piping or Boils	None evident
Foundation Drainage Features	Drainage swale at downstream toe
Toe Drains	None evident
Instrumentation System	None evident

NOTE: Entire dike is covered with extensive brush and tree growth.

PERIODIC INSPECTION CHECKLIST

PROJECT North Grosvenordale Pond Dam DATE 5 April and 10 May 1979

PROJECT FEATURE Sluice Gate NAME

DISCIPLINE Structural/Hydraulics NAME Carl Hoffman

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL (1)	
General Condition of Concrete	Not applicable
Rust or Staining	Not applicable
Spalling	Not applicable
Erosion or Cavitation	Not applicable
Visible Reinforcing	Not applicable
Any Seepage or Efflorescence	Not applicable
Condition at Joints	Not applicable
Drain Holes	Not applicable
Channel	
Loose Rock or Trees Overhanging Channel	Natural River Channel
Condition of Discharge Channel	Good

NOTE (1): Abandoned sluiceway in left spillway structure.
Size unknown, approximately 5 ft. x 5 ft.
Partially blocked up.

PERIODIC INSPECTION CHECKLIST

PROJECT North Grosvenordale Pond Dam DATE 5 April and 10 May 1979

PROJECT FEATURE Spillway NAME

DISCIPLINE Structures NAME C. Hoffman

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Fair
Loose Rock Overhanging Channel	None evident
Trees Overhanging Channel	None
Floor of Approach Channel	Gravel
b. Weir and Training Walls	Masonry
General Condition of Concrete	Some deterioration - spalling
Rust or Staining	Minor
Spalling	Some evident
Any Visible Reinforcing	None
Any Seepage or Efflorescence	Some evident
Drain Holes	Unknown
c. Discharge Channel	
General Condition	Fair - some debris
Loose Rock Overhanging Channel	Some
Trees Overhanging Channel	Yes
Floor of Channel	Natural River Channel
Other Obstructions	Remains of old cribbing on right

PERIODIC INSPECTION CHECKLIST

PROJECT North Grosvenordale Pond Dam DATE 5 April and 10 May 1979

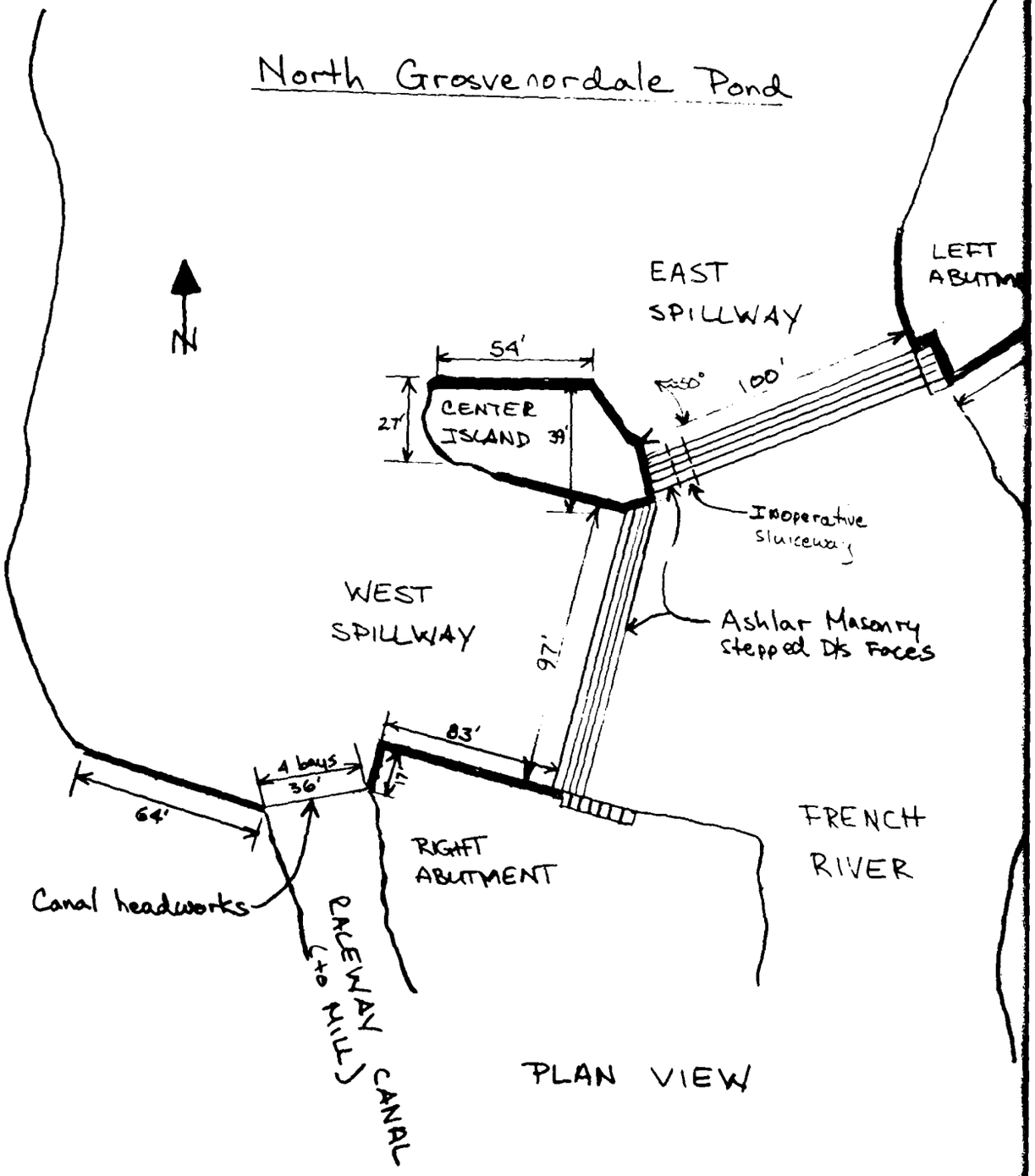
PROJECT FEATURE Service Bridge NAME

DISCIPLINE Structures NAME C. Hoffman

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SERVICE BRIDGE	
a. Superstructure	
Bearings	Fair
Anchor Bolts	Fair
Bridge Seat	Fair
Longitudinal Members	Fair
Underside of Deck	Poor
Secondary Bracing	Fair
Deck	Poor
Drainage System	None
Railings	1½" pipe - Fair
Expansion Joints	None
Paint	Poor
b. Abutment & Piers	
General Condition of Concrete	Fair
Alignment of Abutment	Good
Approach to Bridge	Good
Condition of Seat and Backwall	Not applicable

Appendix B

Engineering Data

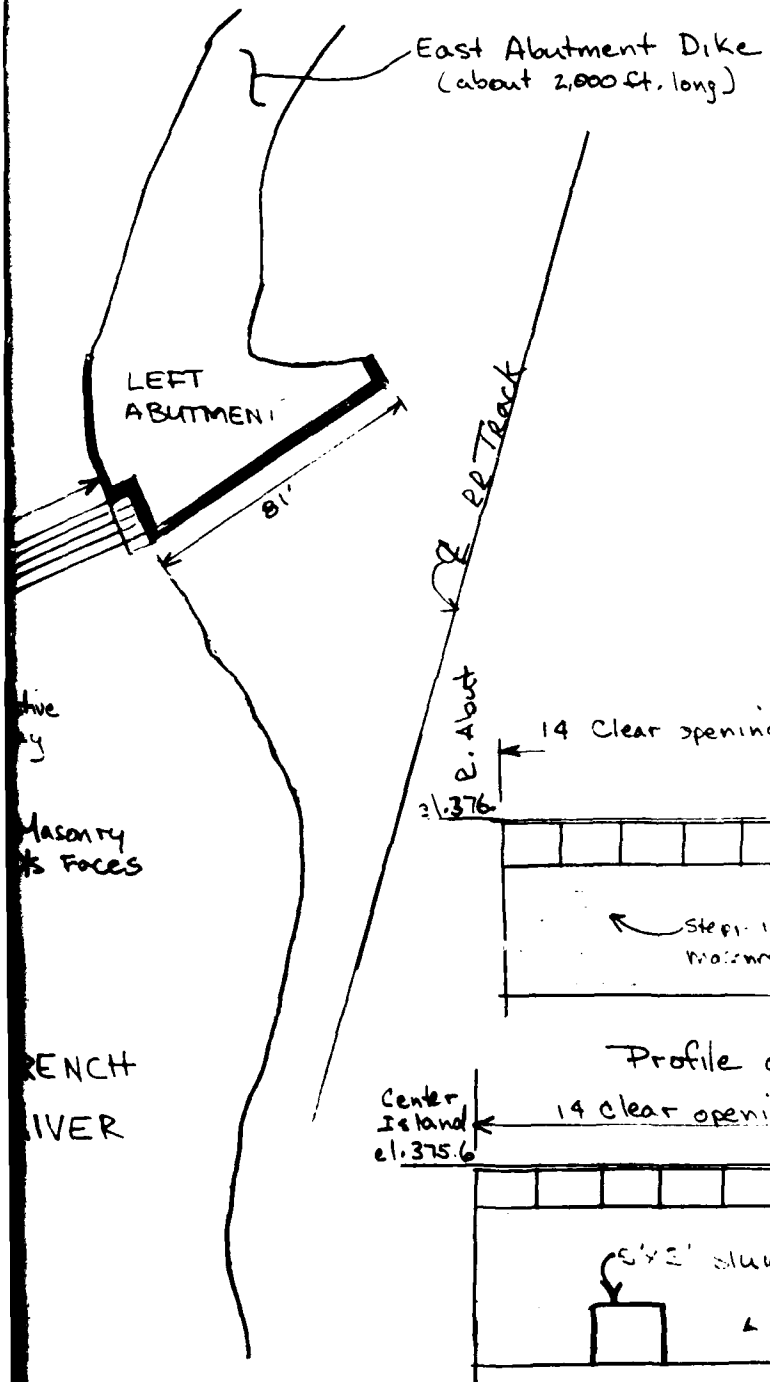


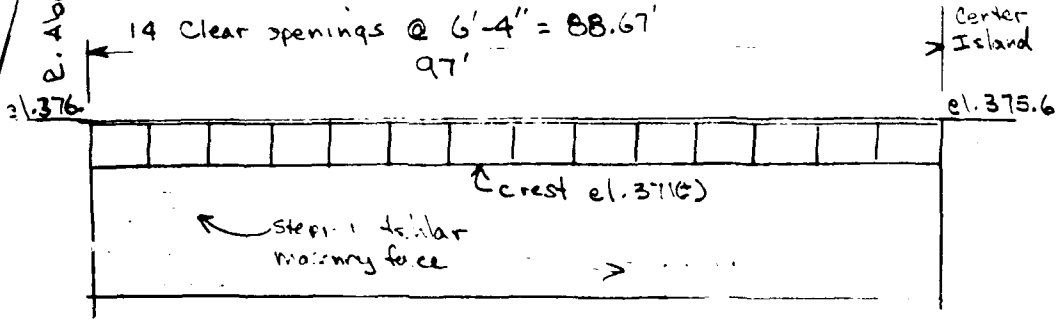
SKETCH PLAN OF N.

(Not to

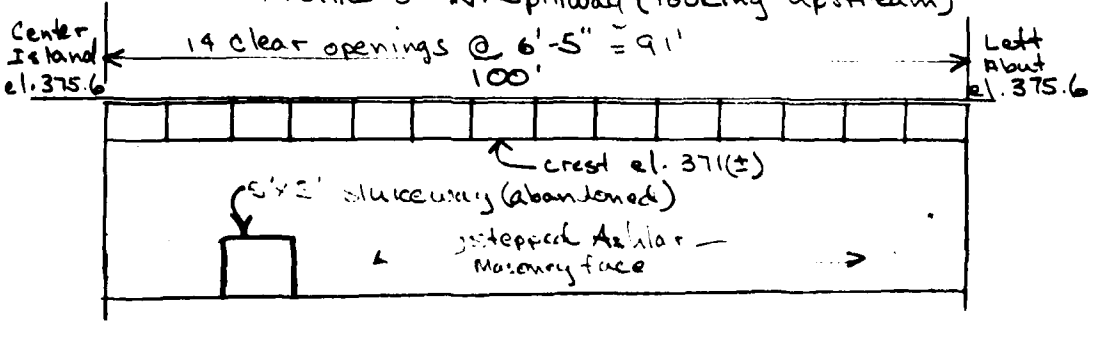
EAST ABUT. DIKE - Elev.

Dist. from L. Abut. wall	Top of Dike Elev. (MSL
0	375.6
100	376.3
220	375.9
300	375.5
400	375.5
500	375.8
600	375.4
[illegible]	375.5
1000	375.6
1200	375.8
1700	375.8
2000	376.5





Profile of W. Spillway (looking upstream)



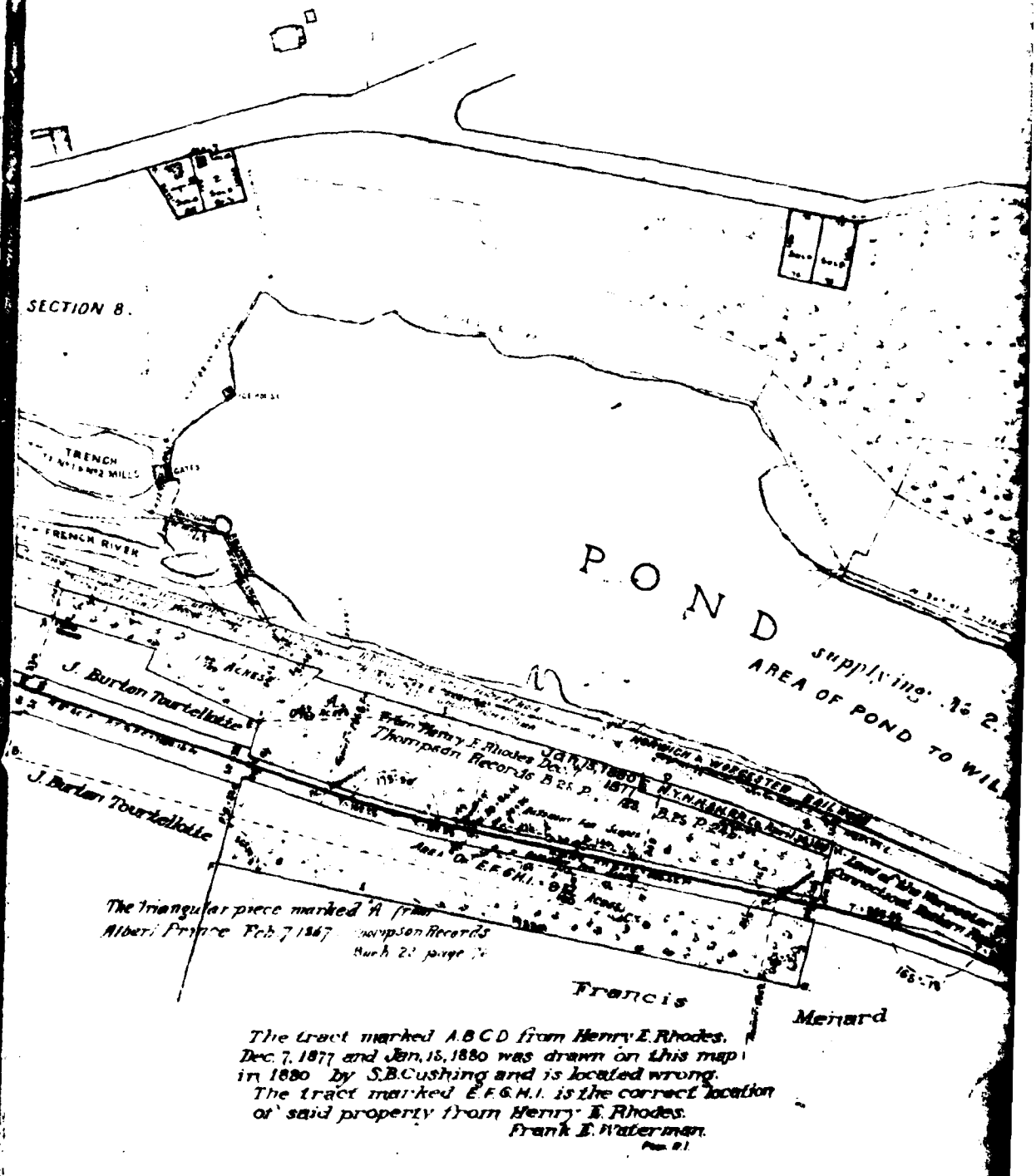
Profile of E. Spillway (looking upstream)

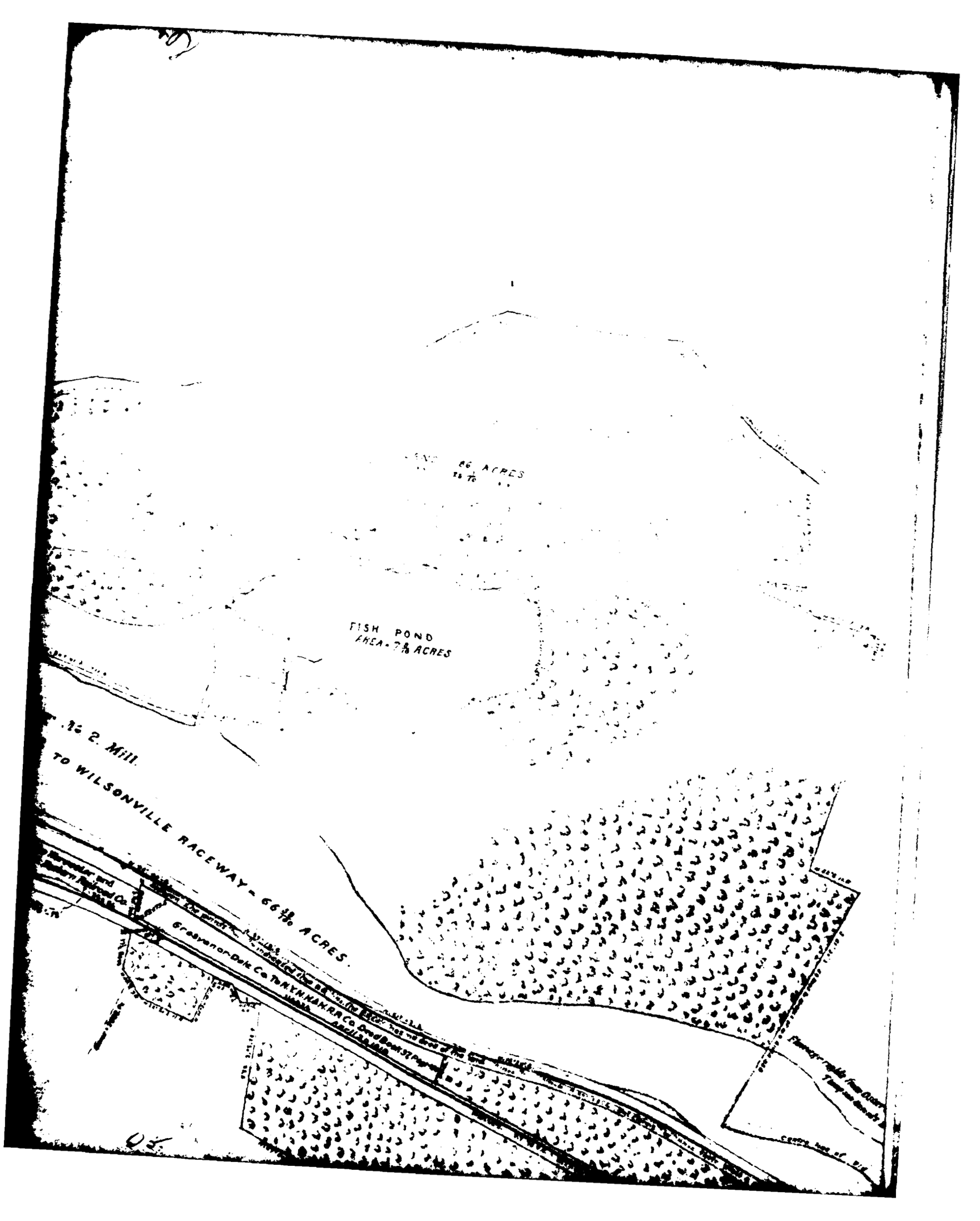
OF N. GREENWOODALE POND DAM

(Not to Scale)

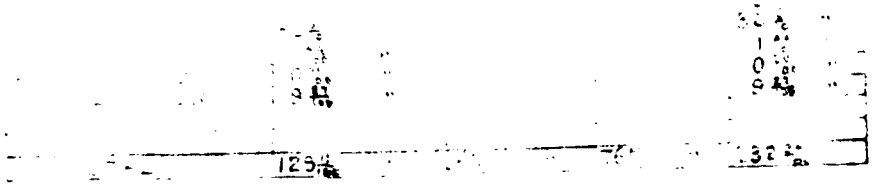
2

SECTION 8.

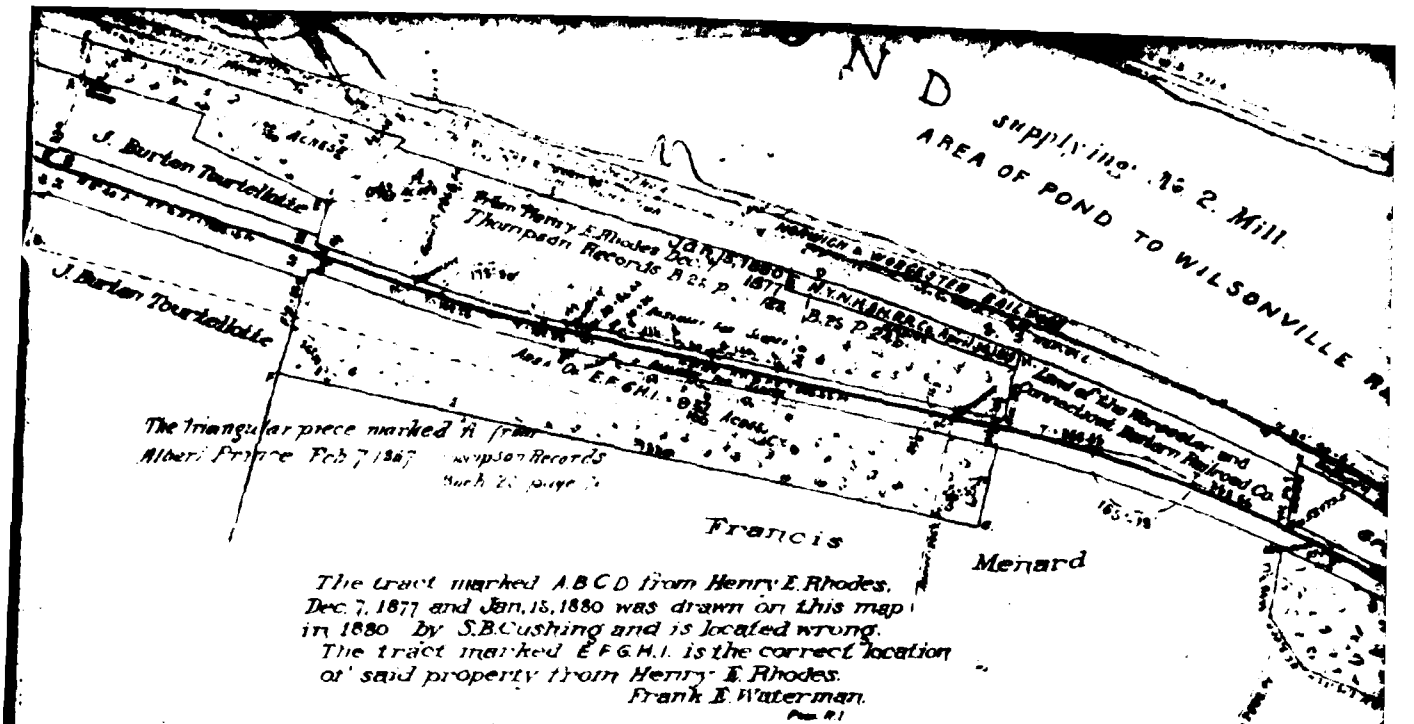

SECTION 8.
TRENCH
FRENCH RIVER
POND supplying No 2.
AREA OF POND TO WIL
J. Burton Tourtellotte
J. Burton Tourtellotte
Francis
Menard
The triangular piece marked A (from Albert Prince Feb 7 1867
Thompson Records
Book 21 page 71
The tract marked A.B.C.D from Henry E. Rhodes. Dec. 7. 1877 and Jan. 18, 1880 was drawn on this map in 1880 by S.B. Cushing and is located wrong.
The tract marked E.F.G.H.I. is the correct location of said property from Henry E. Rhodes.
Frank E. Waterman.

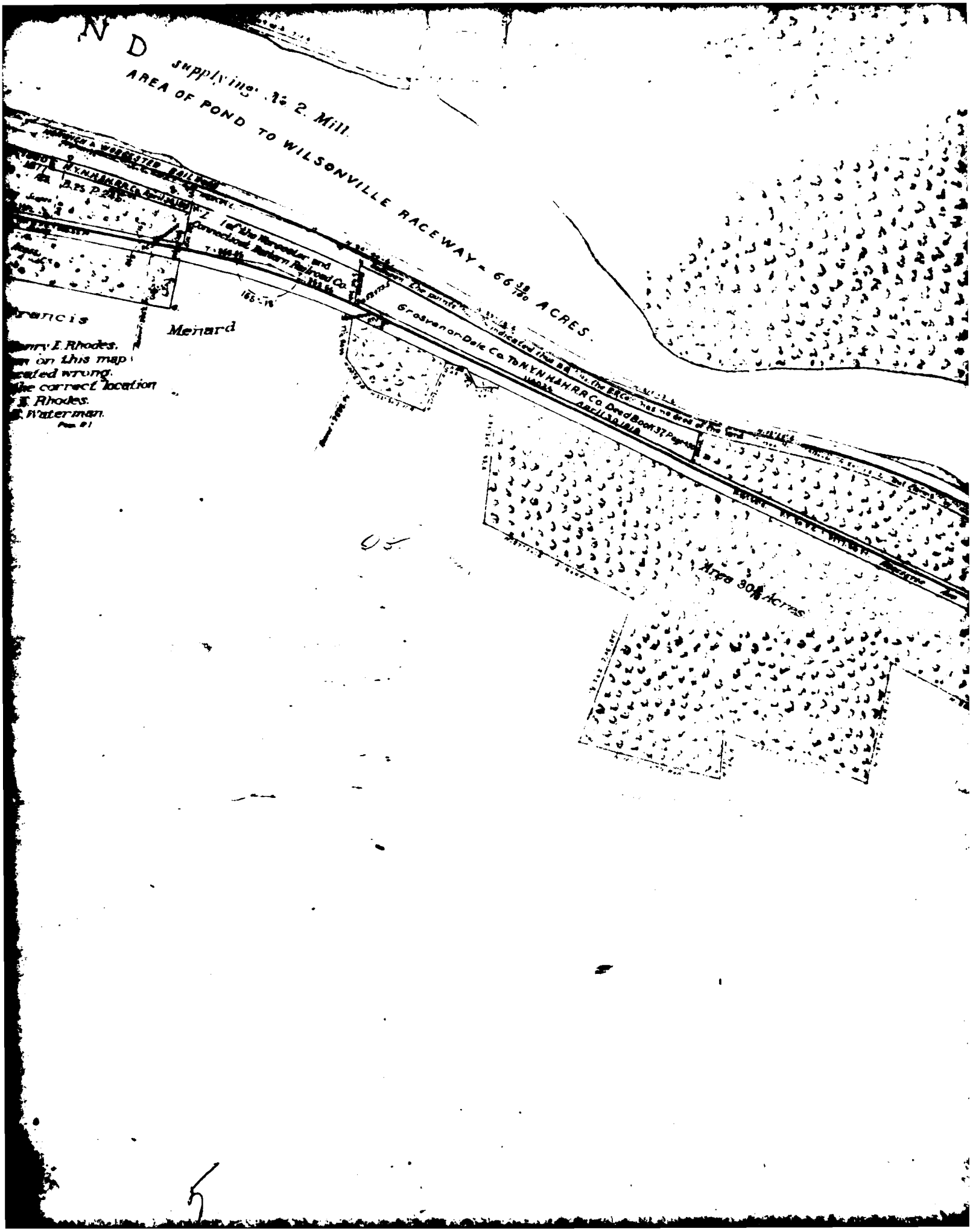

86 ACRES
FISH POND
AREA - 7⅞ ACRES
TO WILSONVILLE RACEWAY - 66 ACRES.

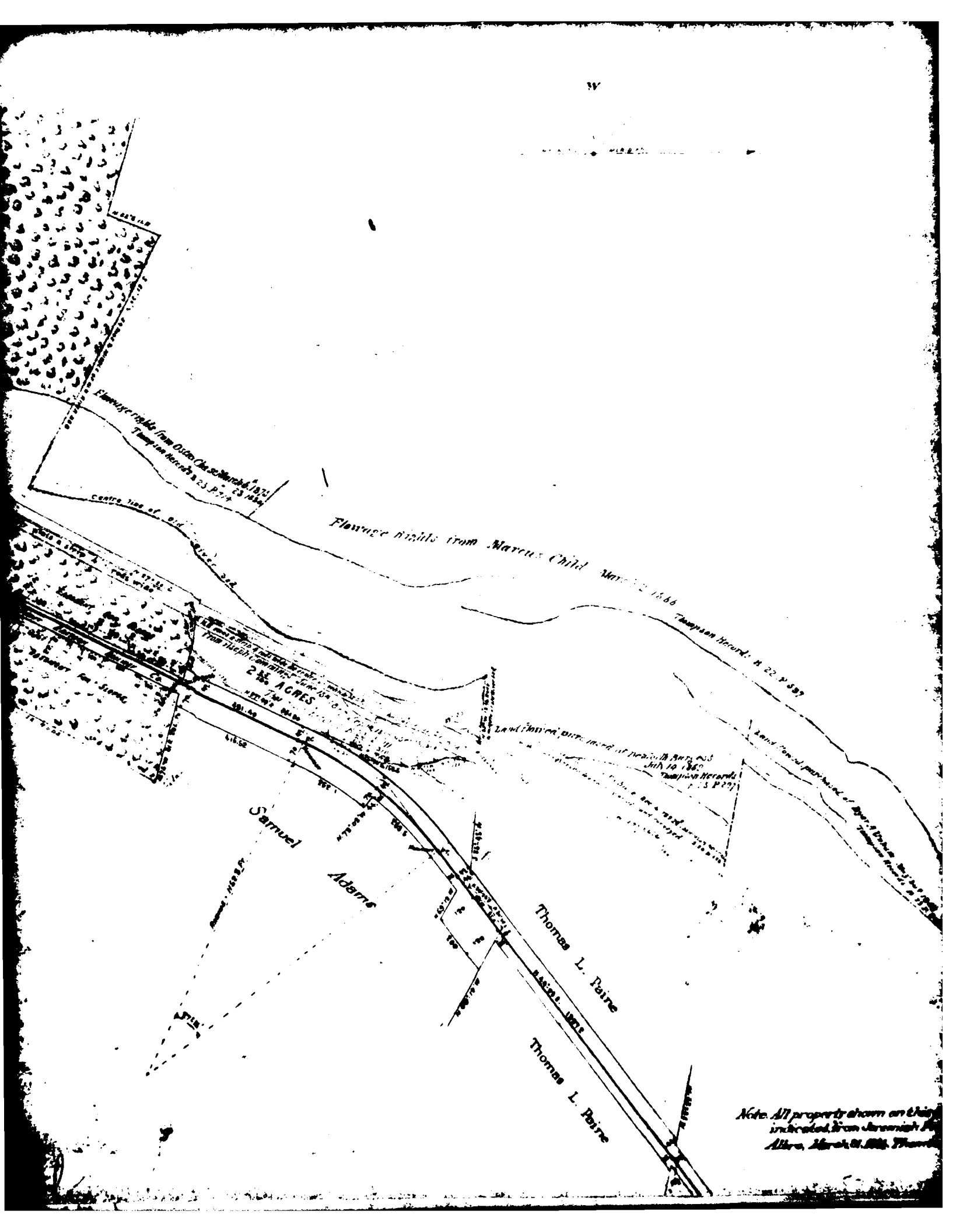
3 1

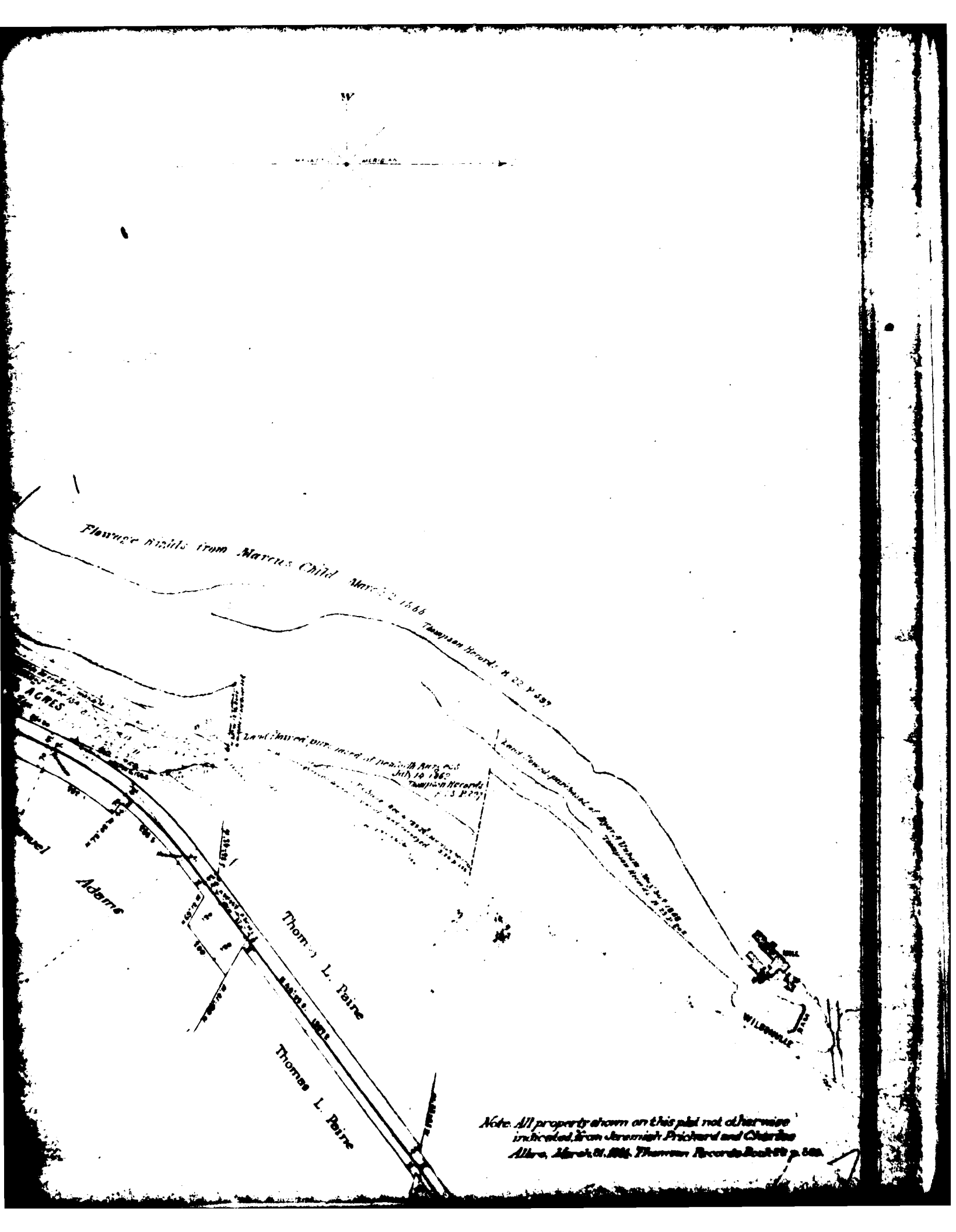


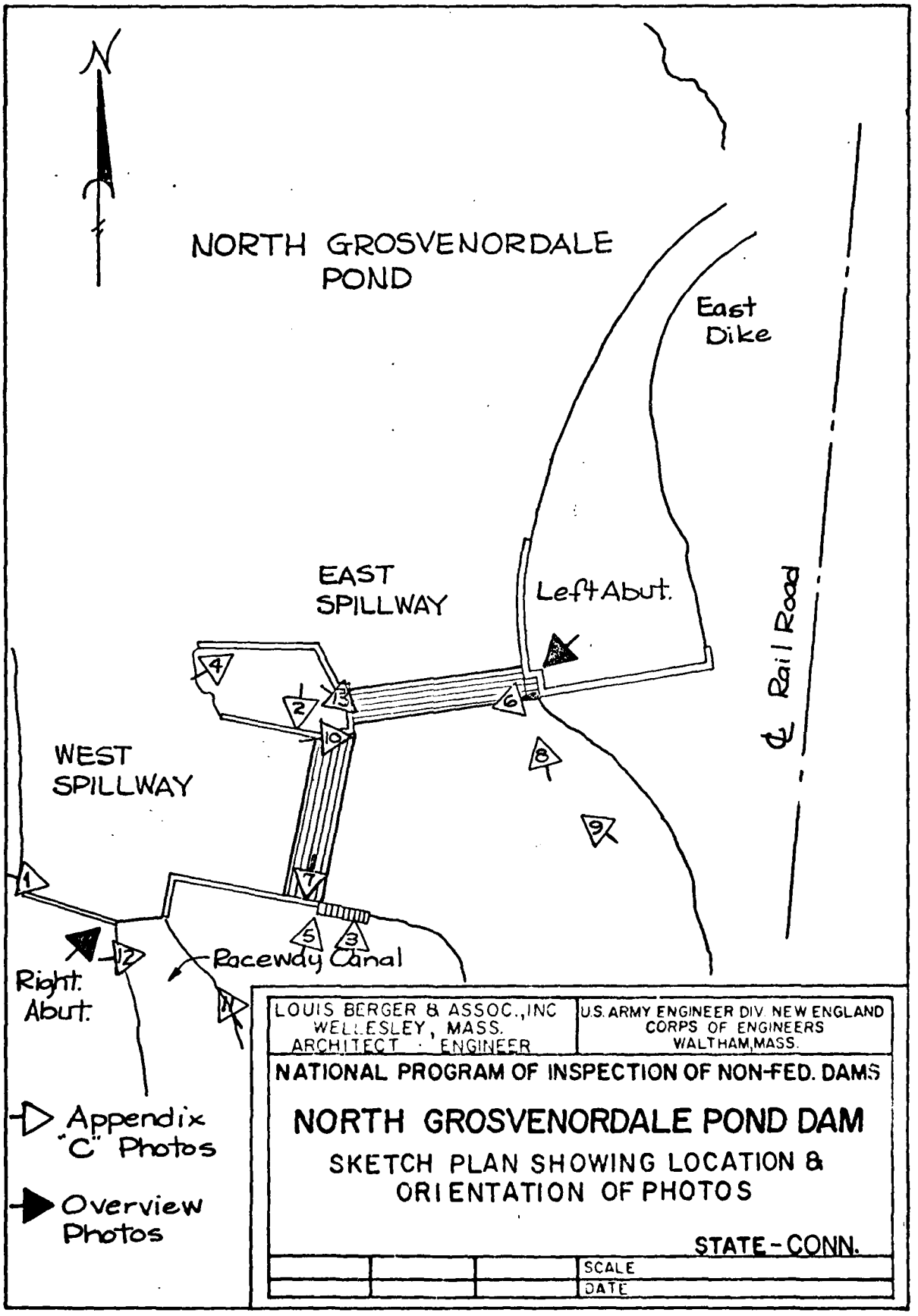
Corrected to February 1920
Frank E Waterman


N D
supplying No 2. Mill
AREA OF POND TO WILSONVILLE R
J. Burton Tourtellotte
J. Burton Tourtellotte
Francis
Menard
The triangular piece marked A from
Albert Prince Feb 7 1887
Thompson Records
Book 2 page 3
The tract marked A.B.C.D from Henry E. Rhodes,
Dec. 7, 1877 and Jan. 18, 1880 was drawn on this map
in 1880 by S.B. Cushing and is located wrong.
The tract marked E.F.G.H.I. is the correct location
of said property from Henry E. Rhodes.
Frank E. Waterman.


N D
supplying No. 2. Mill.
AREA OF POND TO WILSONVILLE RACEWAY = 66 88/100 ACRES.
Meinard
Grosvenor-Dale Co. TO N.V.N.M.&R.R.Co. Deed Book 37 Page
Area 30 Acres


Florence Heights from Marcus Child
Thompson Records
Samuel Adams
Thomas L. Paine
Thomas L. Paine
Thomas L. Paine


Flowers Hills from Marcus Child March 22 1866
Thompson Records B 22 P 537
ACRES
Adams
Thomas L. Paine
Thomas L. Paine
Thomas L. Paine
WILDWOOD
Note. All property shown on this plat not otherwise
indicated from Jeremiah Prichard and Others
Albro, March 21, 1866. Thomson Records Book 59 p. 500.


N
NORTH GROSVENORDALE POND
East Dike
EAST SPILLWAY
Left Abut.
℄ Rail Road
WEST SPILLWAY
Raceway Canal
Right Abut.
Appendix "C" Photos
Overview Photos
LOUIS BERGER & ASSOC., INC
WELLESLEY, MASS.
ARCHITECT · ENGINEER
U.S. ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
NORTH GROSVENORDALE POND DAM
SKETCH PLAN SHOWING LOCATION & ORIENTATION OF PHOTOS
STATE - CONN.
SCALE
DATE

Appendix C

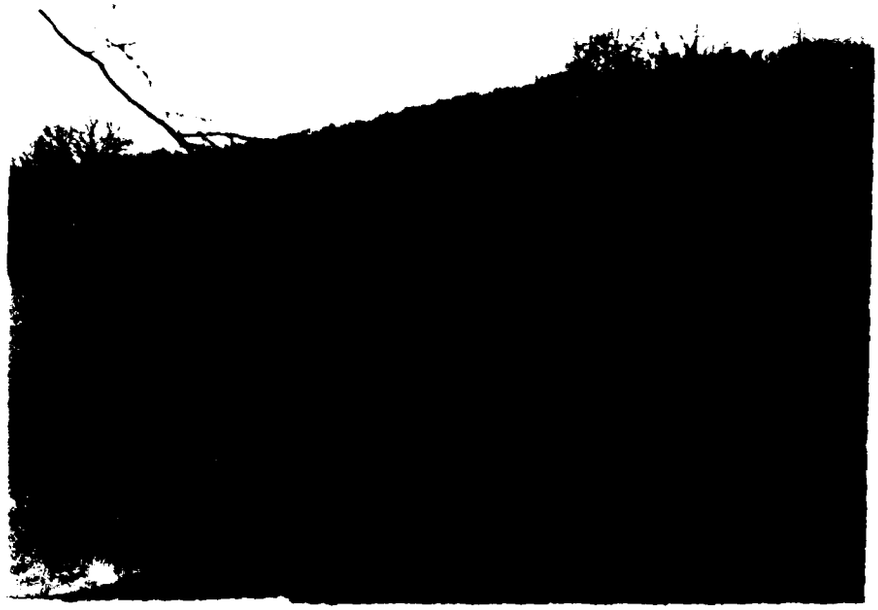
Photographs

NORTH GROSVENORDALE POND DAM

1. View along crest of right abutment

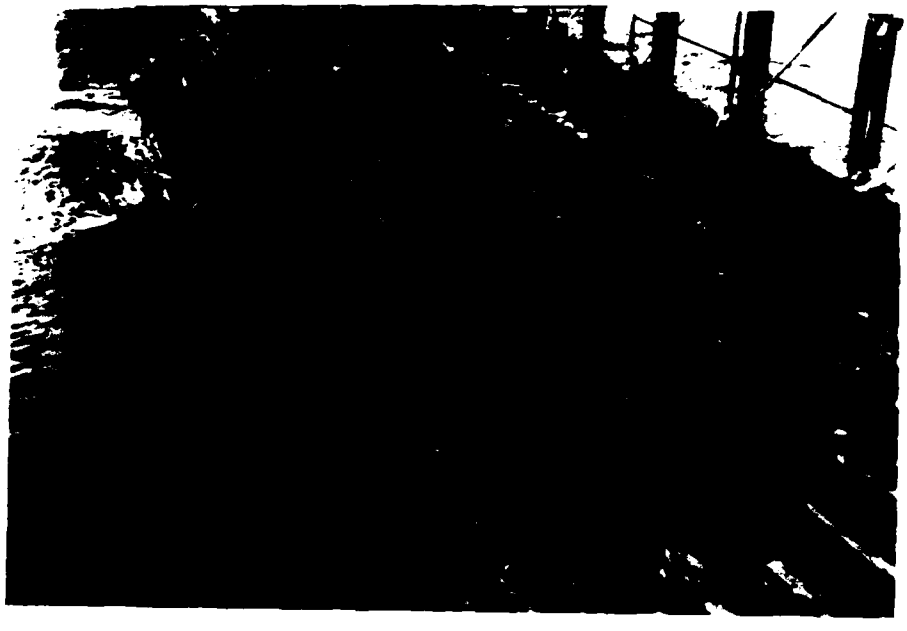
2. Crest of Right Spillway

3. Crest of Left Spillway

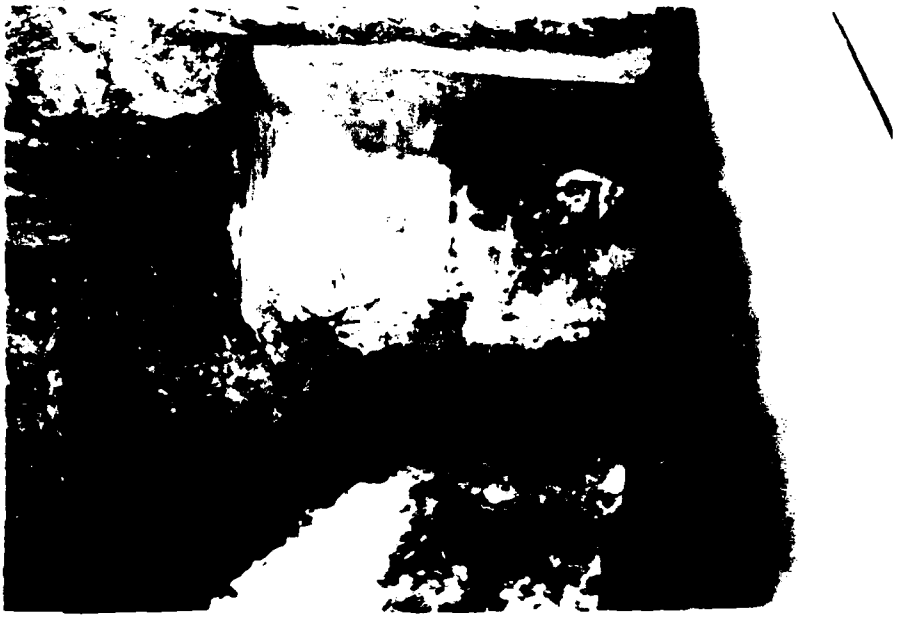


4. Upstream Face of Left Abutment Dike

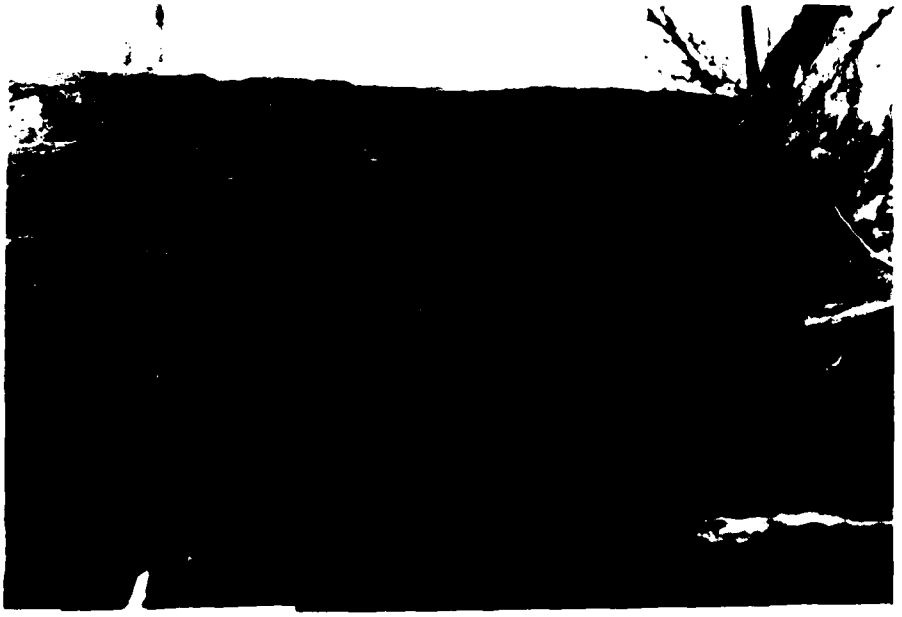
5. Stepped Downstream Face of Left Spillway



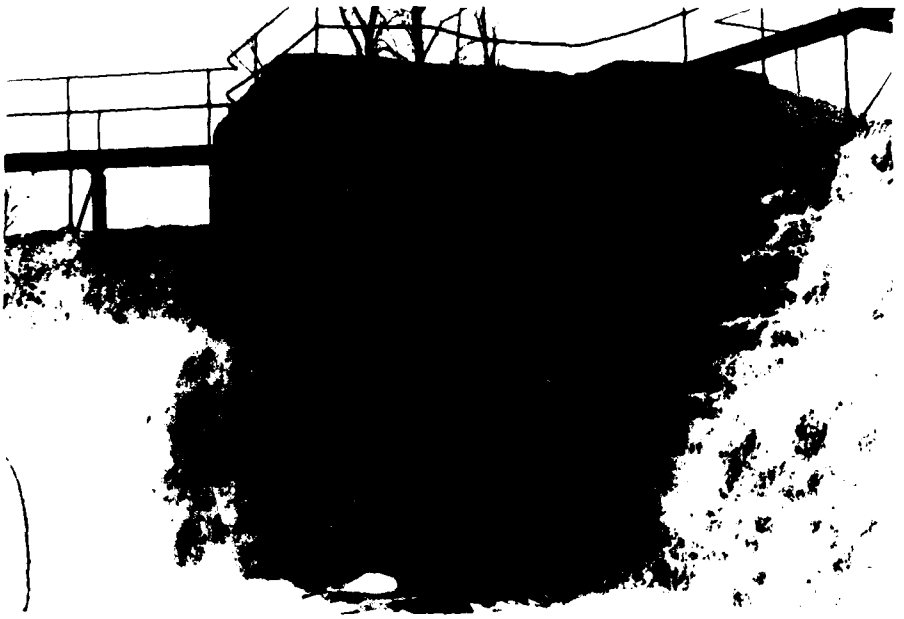
6. Stepped Downstream Face of Left Spillway Showing Missing and Deteriorated Stones.



7. Cavitation and Erosion in Concrete Overlay of West Training Wall, Right Spillway

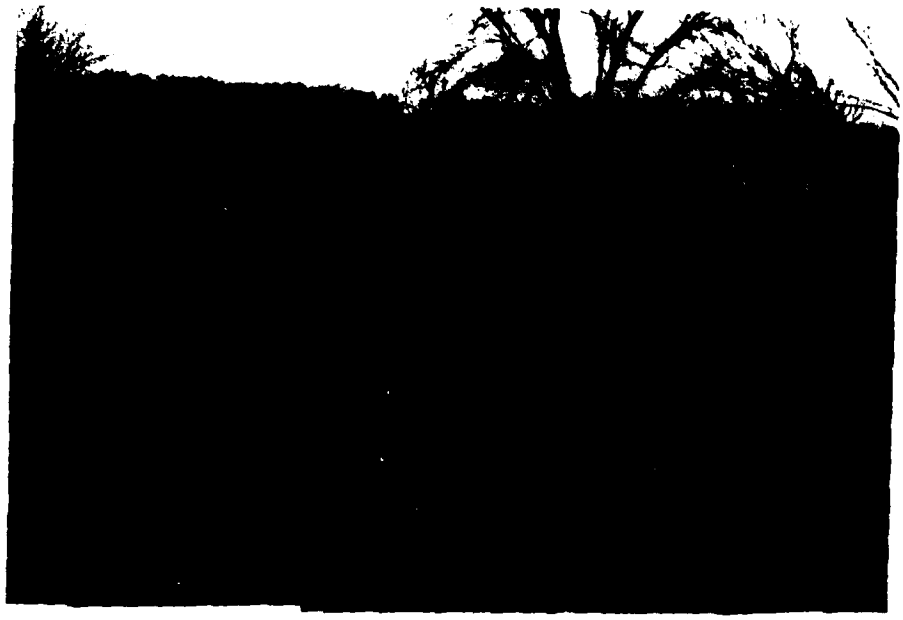


8. Missing Mortar in Joints of Masonry Training Wall East End of East Spillway



9. Masonry Wall Intersection of East and West Spillways Showing Eroded Mortar in Lower Joints and Tree Growing on Face of Wall.

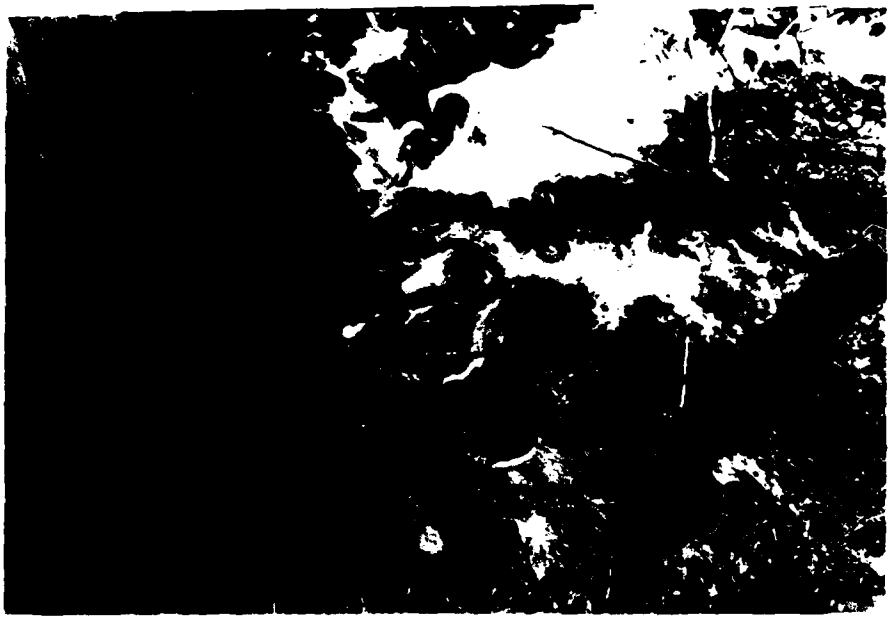
10. Planks Missing from Bridges over Spillways.



11. Diversion Channel and Gate Structure

12. Deteriorated and Inoperable Gates at Diversion Channel

NORTH GROSVENORDALE POND DAM



13. Sluice Outlet Through Left Spillway

Appendix D

Hydrologic and Hydraulic Computations

BY JKH DATE 4/2/19 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1 OF

CHKD. BY DATE INSPECTION OF DAMS - CONN & RI PROJECT

SUBJECT NORTH GROSVENORDALE POND - DRAINAGE AREA

FIND: ENTIRE AREA ABOVE POND

PLANIMETER NO 3651-3
INDEX @ 89.9
1.0 = 1 sq IN

Sheet (See Sheets for area break-up)	Ave Reading (sq in)
Putnam, Conn	3.10
Webster, Conn - Mass.	(8.95 x 10.48 + 4 x 7.5 + 3.5 x 5.5 + 1.5 x 4.5 + 2 x 4.81 + 9.53 + 5.55 + 3.34 + 1.24 + 5.36 - .18) = 184.28
Leicester, Mass.	(27.08 + 24.39 + 31.26 + 11.59 + 15.64 - .03) = 382.50 sq in/sheet - 109.88 sq in = 272.62
Paxton, Mass.	(4.60 + 16.62) = 21.22
Worcester South, Mass.	(5.5 x 5 + 15.90 + 9.29) = 52..
Oxford, Mass, Conn, RI.	(6.4 x 18 + 12.77 + 13.42 + 14.12) = 155.51

TOTAL = 689.42 sq IN

SCALE : $(1")^2 = (2{,}000')^2$, 4,000,000 sq ft/sq in

$$\text{AREA} = \frac{689.42 \text{ sq IN} \times 4{,}000{,}000 \text{ sq ft/sq in}}{43{,}560 \text{ sq ft/ACRE}}$$

63,307.6 ACRES

63,307.6 ACRES ÷ 640 ACRES/sq mi = 98.9 sq mi

BY PC DATE 5.1.79 | LOUIS BERGER & ASSOCIATES INC. | SHEET NO. 1 OF

CHKD. BY DATE | CAPACITY ANALYSIS | PROJECT

SUBJECT No. GROSVENOR POND

CAPACITY ANALYSIS

ELEV. MSL	AREA (AC)	AV. AREA (AC)	HT (FT)	INC. STOR (AC-FT)	CUM. STOR (AC-FT)	SURCHARGE STOR.	REMARKS
353	* 0						BOT. DAM
355	6.7	3.4	2	6.7	6.7		
360	23.4	15.0	5	75.0	81.7		
365	40.0	31.7	5	158.5	240.2		
370	56.7	48.3	6	241.5	481.7		
371	*60.0	58.3	1	58.3	540	0	SPILLWAY
372	63.8	61.9	1	61.9	601.9	61.9	
373	67.7	65.7	1	65.7	667.6	127.6	
374	71.3	69.5	1	69.5	737.1	197.1	
375	75.4	73.3	1	73.3	810.4	270.4	TOP LT. ABUT'T (375.5
376	79.2	77.3	1	77.3	887.7	347.7	TOP RT. ABUT'T.
377	83.1	81.2	1	81.2	968.9	428.9	
378	86.9	85.0	1	85.0	1053.9	513.9	
379	90.8	88.8	1	88.8	1142.7	602.7	
380	*94.6	92.7	1	92.7	1235.4	695.4	

NOTE: HT. DAM = 18.0' FROM FIELD MEAS. & ACOE INVENTORY

* KNOWN BY PLANIMETER - AREAS INTERPOLATED BETWEEN.

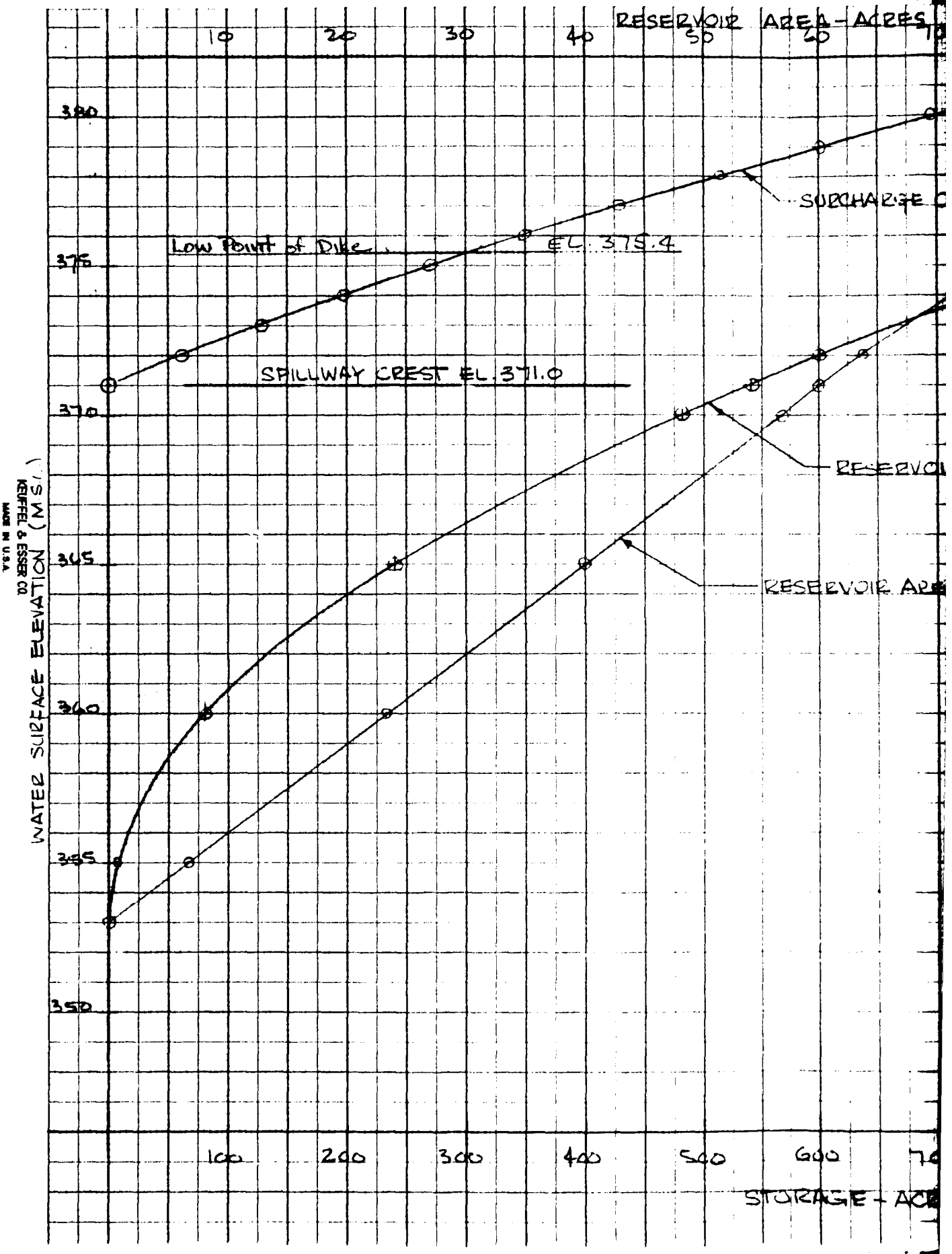
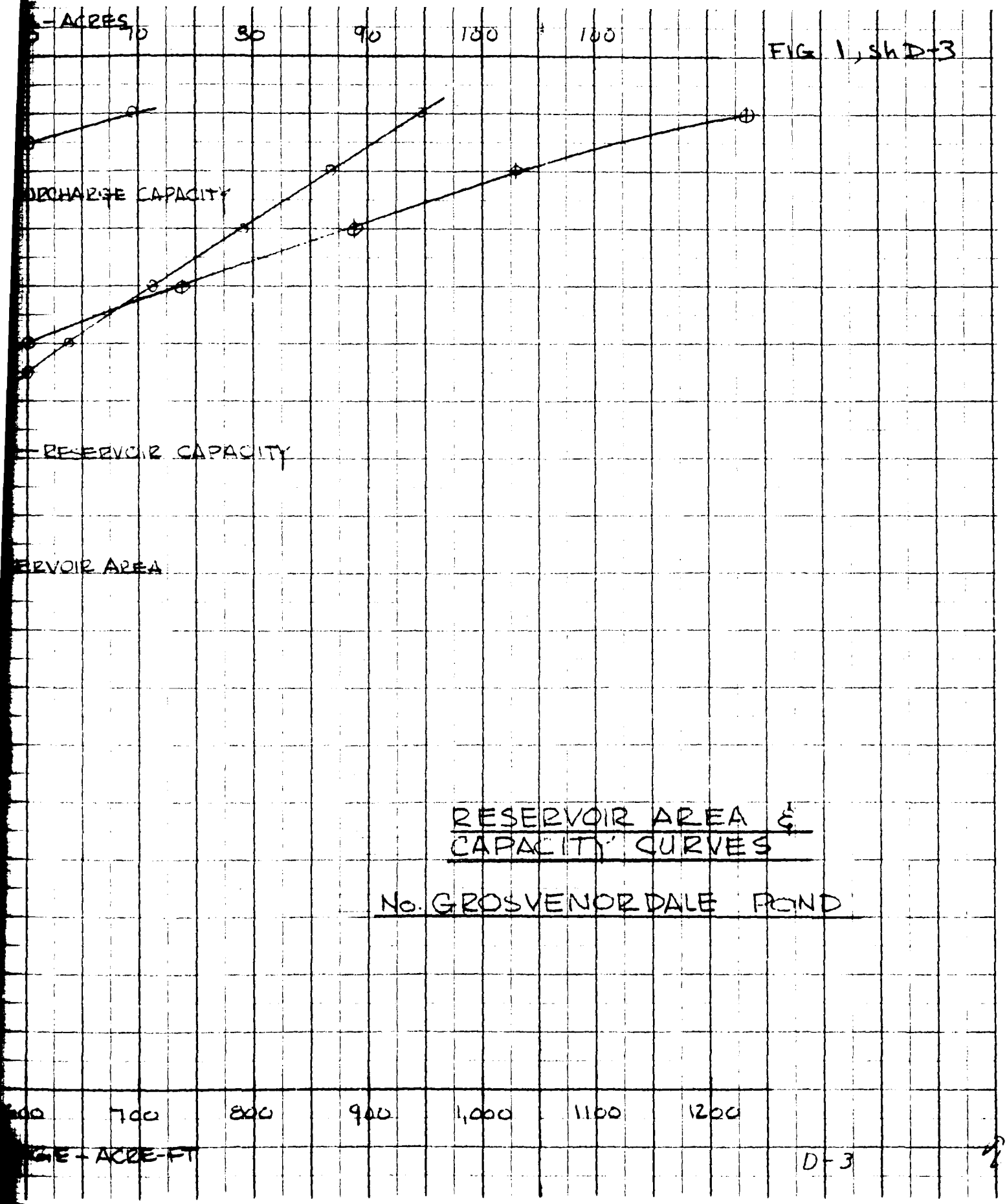

RESERVOIR AREA - ACRES
10
20
30
40
50
60
380
375
370
365
360
355
350
Low Point of Dike
EL. 375.4
SPILLWAY CREST EL. 371.0
SURCHARGE
RESERVOIR
RESERVOIR AREA
WATER SURFACE ELEVATION (M.S.L.)
KEUFFEL & ESSER CO
MADE IN U.S.A.
100
200
300
400
500
600
STORAGE - ACRE

FIG 1, Sh D-3



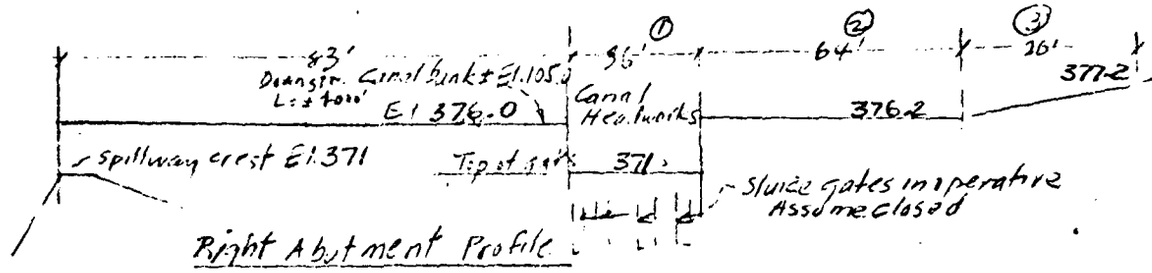
RESERVOIR AREA & CAPACITY CURVES

No. GROSVENORDALE POND

BY. RJH DATE 4-17-79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1 OF

CHKD. BY DATE INSPECTION OF DAMS - CONN. T R C PROJECT

SUBJECT GROVENORVILLE DAM - DISCHARGE OVER SPILLWAYS & ABUTMENTS



Right Abutment Profile

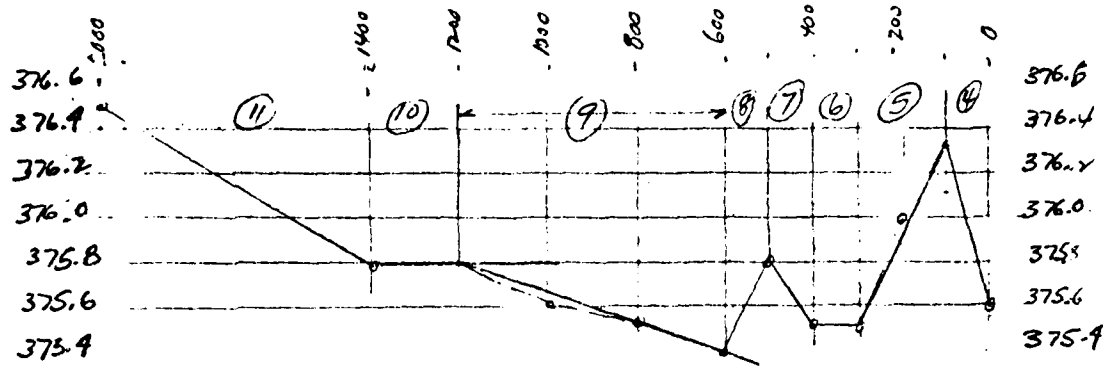
Elev	Canal Headworks c=2.6 H	q/ft	ΔQ	Downstr. Canal Bank c=2.7 L=1000' H	q/ft	ΔQ	Actual Disch. thru Headworks	Over 64' length L=64 c=2.5 H	q/ft	ΔQ	Avg q/ft	L	ΔQ
371.0	0												
372	1.0												
373	2.0												
374	3.0												
375	4.5												
376	5.0	29.1	1046	0	-	0	0						
376.2	5.2	30.8	1110	0.2	.24	240	240	0		0	0		0
376.5	5.5	33.5	1207	0.5	.95	950	950	0.3	0.41	26	0.21	7.8	2
377	6.0	38.2	1376	1.0	2.7	2700	1376	0.8	1.79	115	0.85	20.8	18
377.5	6.5	43.1	1550	1.5		=	1550	1.3	3.71	237	1.86	32	60
378.	7.0	48.1	1733	2.0		—	1733	1.8	6.04	387	3.02	47	142
380.	9.0	70.2	2527				2527	3.8	18.5	1185	14.48	47	704
							①			②			③

Elev.	H over Crest	83' Abutment c=2.5 H	q/ft	ΔQ	Total over Right qout sum of ① ② ③ + ④
371	0				
372	1.0				
373	2.0				
374	3.0				
375	4.0				
376	5.0	0	0	0	0
376.2	5.2	0.2	0.22	18	258
376.5	5.5	0.5	0.88	73	1051
377	6.0	1.0	2.50	208	1717
377.5	6.5	1.5	4.59	381	2228
378.	7.0	2.0	7.07	857	3119
380	9.0	4.0	20	1660	6076
				④	

BY JJT DATE 4-17-79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 2 OF

CHKD. BY DATE INSPECTION OF DAMS - CONN. & RI PROJECT

SUBJECT GROVERNOURVILLE DAM - DISCHARGE OVER SPILLWAY & ABUTMENTS



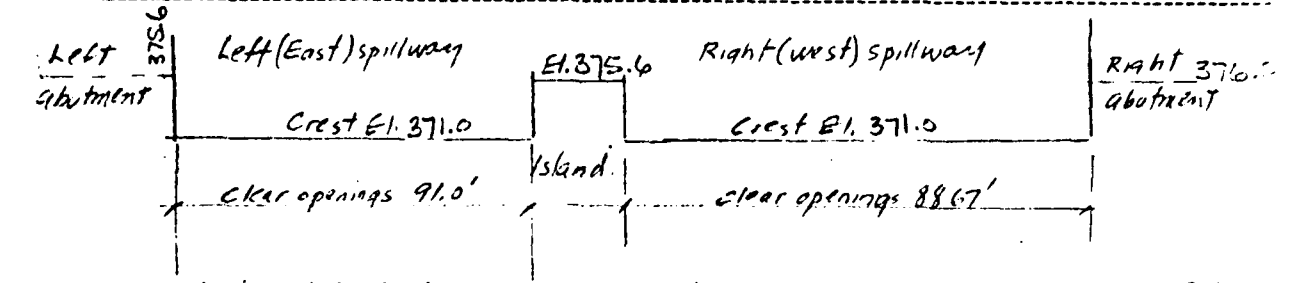
Elev	Sta 0 to 1+00 C = 2.8 (4) H	Ave q/ft	L	ΔQ	Sta 1+00 to 3+00 H	Ave q/ft	L	ΔQ	(5) Sta 3+00 to Sta 4+00 L = 100 H	Ave q/ft	ΔQ	(6) Sta 4+00 to 5+00 H	Ave q/ft	L	ΔQ
375.4															
375.5					0	0		0	0	0		0			0
375.6	0	0		0	0.1	0.05	25	1	0.1	0.09	9	0.1	0.05	33	2
375.8	0.2	0.25	29	3	0.3	0.23	75	17	0.3	0.46	46	0.3	0.23	100	23
376.	0.4	0.71	57	21	0.5	0.50	125	63	0.5	0.99	99	0.5	0.62	100	62
376.3	0.7	1.64	100	82	0.8	1.00	200	200	0.8	2.00	200	0.8	1.50	100	150
376.5	0.9	2.39	100	132	1.0	1.53	200	306	1.0	2.80	280	1.0	2.22	100	222
377.0	1.4	4.64	100	314	1.5	3.39	200	678	1.5	5.14	514	1.5	4.41	100	441
377.5	1.9	7.33	100	550	2.0	5.80	200	1160	2.0	7.92	792	2.0	7.07	100	707
378.0	2.4	10.41	100	831	2.5	8.64	200	1728	2.5	11.07	1107	2.5	10.11	100	1011
380	4.4	25.81	100	2282	4.5	23.24	200	4649	4.5	26.73	2673	4.5	22.46	100	2246

Elev	Sta 5+00 to 6+00 H	Ave q/ft	L	(8) ΔQ	Sta 6+00 to 12+00 L = 600' H	Ave q/ft	L	(9) ΔQ	Sta 12+00 to 14+00 L = 200 H	Ave q/ft	(10) ΔQ	Sta 12+00 to 20+00 H	Ave q/ft	L	(11) ΔQ	Total ΣQ to
375.4	0				0			0								0
375.5	0.1	0.05	25	1	0.1	0.05	150	8								9
375.6	0.2	0.12	50	6	0.2	0.12	300	36								54
375.8	0.4	0.30	100	36	0.4	0.36	600	216	0		0	0.			0	341
376.0	0.6	0.78	100	78	0.6	0.78	600	468	0.2	0.25	50	0.2	0.12	171	21	862
376.3	0.9	1.69	100	169	0.9	1.69	600	1014	0.5	0.99	198	0.5	0.50	420	214	2227
376.5	1.1	2.44	100	240	1.1	2.44	600	1464	0.7	1.64	328	0.7	0.82	600	492	3468
377	1.6	4.68	100	468	1.6	4.68	600	2803	1.2	3.68	736	1.2	2.34	600	1400	7354
377.5	2.1	7.37	100	737	2.1	7.37	600	4422	1.7	6.21	1242	1.7	4.50	600	2700	12312
378.	2.6	10.44	100	1044	2.6	10.44	600	6264	2.2	9.14	1828	2.2	7.14	600	4284	18017
380	4.6	25.24	100	2524	4.8	25.84	600	15504	4.2	24.10	4820	4.2	19.92	600	11952	41604

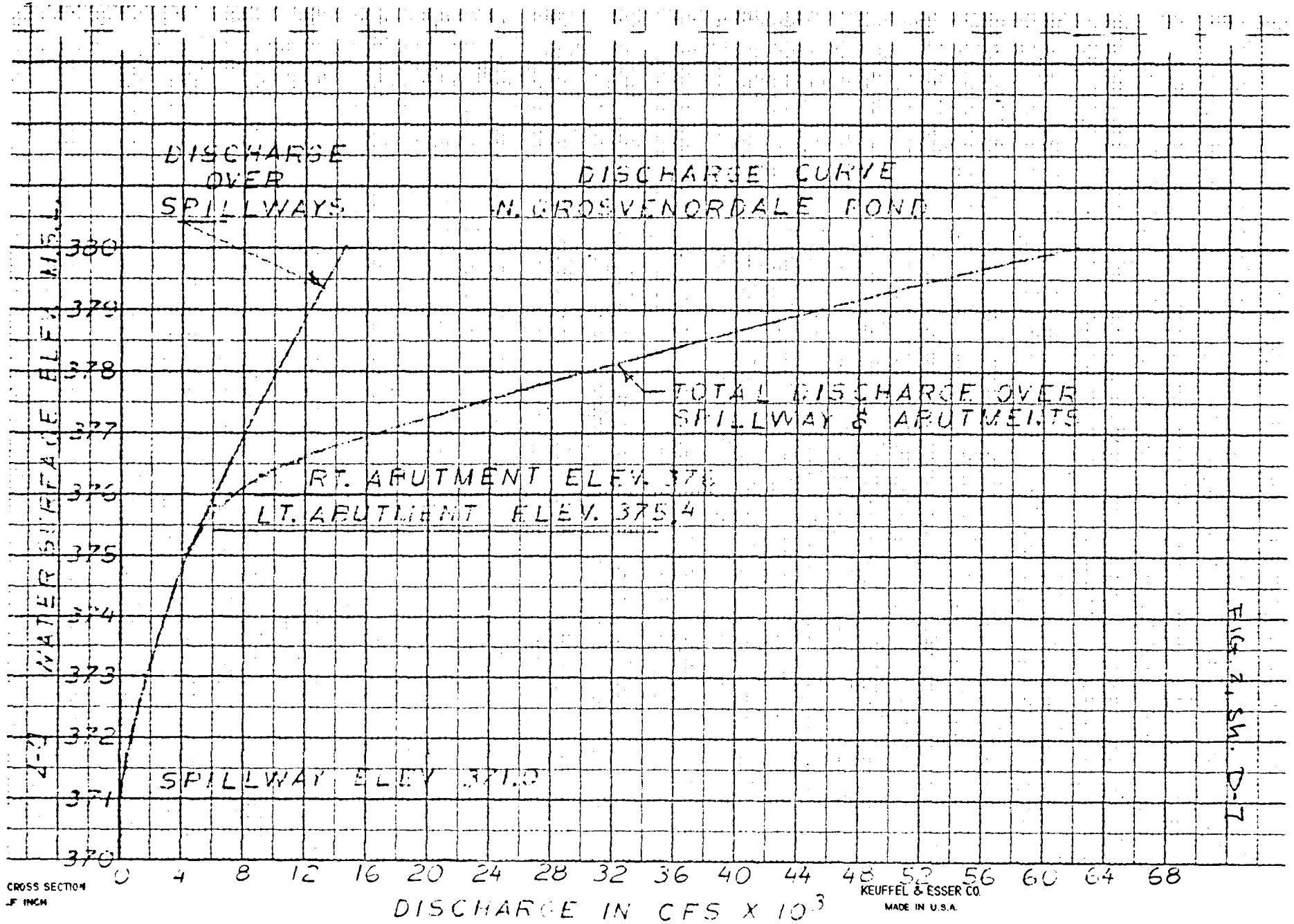
BY O.H. DATE 4-17-79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 3 OF

CHKD. BY DATE INSPECTION OF DAMS - CONN. R.I. PROJECT

SUBJECT GLENVENOUR VILLE DAM - DISCHARGE OVER SPILLWAYS and ABUTMENTS



Elev	H over crest	C if H ≤ 3.0	Left Spillway L = 91' ΔQ	Right Spillway L = 88.67' ΔQ	Total Both Spillways	Right Abutment	Left Abutment	Total Discharge
371.0	0		0		0			0
371.5	0.5	1.06	96	94	190			190
372.0	1.0	3.00	273	266	539			539
373.0	2.0	3.49	773	753	1526			1526
374.0	3.0	15.59	1419	1382	2801			2801
375.0	4.0	24.00	2184	2128	4312		0	4312
375.5	4.5	28.64	2606	2540	5146		9	5155
375.6	4.6	29.60	2694	2625	5319		54	5373
375.8	4.8	31.55	2871	2798	5669		341	6010
376.0	5.0	33.54	3058	2974	6032	0	862	6894
376.3	5.3	36.60	3331	3245	6576	258	2227	9061
376.5	5.5	38.70	3527	3432	6954	1051	3468	11473
377.0	6.0	44.10	4013	3910	7923	1717	7354	16994
377.5	6.5	49.72	4525	4409	8934	2278	12310	23522
378.0	7.0	55.56	5056	4927	9983	3119	18098	31200
380.0	9.0	81.0	7371	7182	14553	6076	41604	62233


DISCHARGE CURVE
N. CROSVENORDALE POND
DISCHARGE OVER SPILLWAYS
TOTAL DISCHARGE OVER SPILLWAY & ABUTMENTS
RT. ABUTMENT ELEV. 378
LT. ABUTMENT ELEV. 375.4
SPILLWAY ELEV. 371.0
WATER SURFACE ELEV. M.S.L.
380
379
378
377
376
375
374
373
372
371
370
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68
DISCHARGE IN CFS X 10³
FIG. 4, SH. D-7
D-7
CROSS SECTION
.F INCH
KEUFFEL & ESSER CO.
MADE IN U.S.A.

BY RFB DATE 6/19/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. ____ OF ____

CHKD. BY ____ DATE ____ INSPECTION OF DAM PROJECT ____

SUBJECT NORTH GROSVENORDALE POND TEST FLOOD

D.A = 98.9 SQ MI

SIZE CLASSIFICATION = SMALL

HAZARD CLASSIFICATION = HIGH

INSPECTION FLOOD = ½ PMF TO FULL PMF

CALCULATE PMF USING "PRELIMINARY GUIDANCE FOR ESTIMATING MAXIMUM PROBABLE DISCHARGE IN PHASE I DAM SURVEY INVESTIGATIONS, MARCH, 1978."

ASSUME THAT DRAINAGE AREAS ABOVE C.O.E. PROJECTS AT BUFFUMVILLE AND HODGES VILLAGE DO NOT CONTRIBUTE TO PMF AT NORTH GROSVENORDALE

ENTIRE DRAINAGE AREA	=	98.9
ABOVE BUFFUMVILLE	=	26.5
ABOVE HODGES VILLAGE	=	31.1
NET DRAINAGE AREA	=	41.3 SQ MI

USING CORP ENVELOPE CURVE:

FOR A = 41.3, ROLLING TERRAIN, PEAK Q = 1230 CFS/MI²

$Q_{PMF} = 1230(41.3) = 50{,}800$

$\frac{1}{2}$ PMF = $\frac{50{,}800}{2}$ = 25,400 CFS

USE Q_{TEST} = 25,400 CFS

BY _____ DATE 5.8.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1 OF _____

CHKD. BY _____ DATE _____ INSPECTION OF DAMS PROJECT _____

SUBJECT FAILURE ANALYSIS – No. GROSVENORDALE

FAILURE ANALYSIS #1 – BREACH IN DIKE

ASSUME 500' LONG x 7' HIGH BREACH
WATER SURFACE ELEVATION 376.0 ≅ 6" OVER DIKE LOW PT.

$Q_{P_1} = Q_{BREACH} + Q_{SPILLWAYS}$

$Q_{BREACH} = 8/27\, W_b \sqrt{g}\, Y_o^{3/2}$

$= 8/27 (500')(7)\sqrt{32.2}(7)^{3/2}$

$= (148.1)(5.67)(18.52) = 15,552$ CFS

$Q_{SPILLWAYS}$ EL. 376.0 = 6,032 CFS (DISCHARGE CURVE)

∴ $Q_{P_1} = 15,552 + 6,032 = 21,584$ CFS

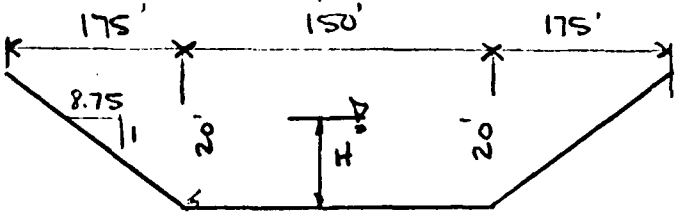
$Q_{P_1} = 21,600$ CFS

STORAGE CAPACITY AT EL. 376.0 = 888 AC-FT

$S/2 = 444$ AC-FT

STEP 3: – STAGE – DISCHARGE CURVE FOR DOWNSTREAM REACH

TYPICAL SECTION @ 150' D/S



BY ____ DATE 5.8.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 2 OF

CHKD. BY ____ DATE ____ INSPECTION OF DAMS PROJECT ____

SUBJECT FAILURE ANALYSIS - No. GROSVENORDALE

H	A (SF)	P (LF)	$R^{2/3}$	$1.486/n$	$S^{1/2}$	Q CFS
5	969	238	2.55	$\frac{1.486}{0.14}$, 10.61	.071	1821
10	2375	326	3.76	10.61	"	6727
15	4219	414	4.70	10.61	"	14,937
20	6500	502	5.52	10.61	"	27,028

$S_{AV} \approx .005$ $S^{1/2} = .071$ $Q = VA = A\left(\frac{1.486}{n} R^{2/3} S^{1/2}\right)$

$n = 0.14$ - HDS # 3 - pg. 102)

$S = 888$ Ac-FT

$S/2 = 444$ AC-FT

STEP 4: ESTIMATE Q_{P_2}

$Q_{P_1} = 21,600$ CFS STAGE$_1$ = 17.9 FT

TRY $L_{REACH_1} = 1500'$

$A_1 = (17.9 \times 8.75 \times 17.9) + (17.9 \times 150') = 5488$ SF

$V_1 = \frac{1500' \times 5488}{43560} = 189$ AC-FT < 444 AC-FT OK

TRIAL $Q_{P_2} = Q_{P_1}\left(1 - \frac{V_1}{S_1}\right) = 21,600\left(1 - \frac{189}{888}\right) = 17,002$ CFS

TRIAL STAGE$_2$ = 16.0FT

$A_2 = (16 \times 8.75 \times 16) + (16 \times 150) = 2240 + 2400$ 4640 SF

$V_2 = \frac{4640 \times 1500}{43,560} = 160$ AC-FT

$V_{AV} = \frac{V_1 + V_2}{2} = \frac{189 + 160}{2} = 174.5$ AC-FT

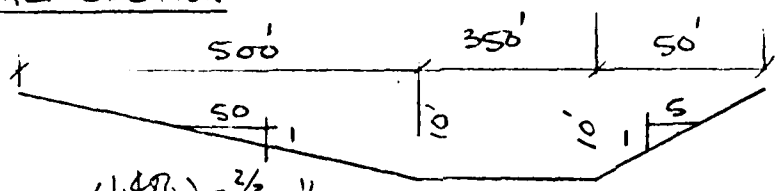
$Q_{P_2} = Q_{P_1}\left(1 - \frac{V_{AV}}{S}\right) = 21,600\left(1 - \frac{174.5}{888}\right) = 17,355$ CFS

STAGE$_2$ = 16.1 FT

∴ AT 1500' D/S $Q_{P_2} = 17,355$ CFS
$STAGE_2 = 16.1$ FT

TRY $REACH_2 = 2000'$ (3500' D/S)

TYPICAL SECTION



$n = 0.14$

$S_{AVE} = .005$

$S^{1/2} = .071$

$Q = VA = A\left(\frac{1.486}{n}\right) R^{2/3} S^{1/2}$

H	A	P	$R^{2/3}$	$1.486/n$	$S^{1/2}$	Q CFS
5	2437	625.5	2.48	10.61	0.071	4552
10	6250	901.0	3.64	"	"	17,138
15	11,437.	1175	4.56	"	"	39,287

FOR $REACH_2$ – S-D CURVE – $Q_{P_2} = 17,355$ CFS
$STAGE_2 = 10.1$ FT

STEP 4: – ESTIMATE Q_{P_3}

$Q_{P_2} = 17,355$ CFS $\quad STAGE_2 = 10.1$ FT

$$A_2 = \frac{10.1 \times 50 \times 10.1}{2} + 350 \times 10.1 + \frac{10.1 \times 5 \times 10.1}{2}$$

$$= 2550. + 3535 + 255 = 6340 \text{ SF}$$

$$V_2 = \frac{6340 \times 2000}{43560} = 291 \text{ AC-FT} < 444 \text{ AC-FT OC}$$

$$\text{TRIAL } Q_{P_3} = Q_{P_2}\left(1 - \frac{V_2}{S}\right) = 17,355\left(1 - \frac{291}{888}\right)$$

$$= \underline{11,668 \text{ CFS}}$$

TRIAL $Q_{p_3} = 11,663$ CFS
TRIAL $STAGE_3 = 8.3$ FT

$$A_3 = \frac{8.3 \times 50 \times 8.3}{2} + (350 \times 8.3) + \frac{8.3 \times 5 \times 8.3}{2}$$

$$= 1722 + 2905 + 172 = 4799$$

$$V_3 = \frac{4799 \times 2100}{43560} = 220 \text{ AC-FT} < 444 \text{ OK}$$

$$V_{AV} = \frac{V_2 + V_3}{2} = \frac{291 + 220}{2} = 255.5$$

$$Q_{p_3} = Q_{p_2}\left(1 - \frac{V_{AV}}{S}\right) = 17,355\left(1 - \frac{255}{888}\right)$$

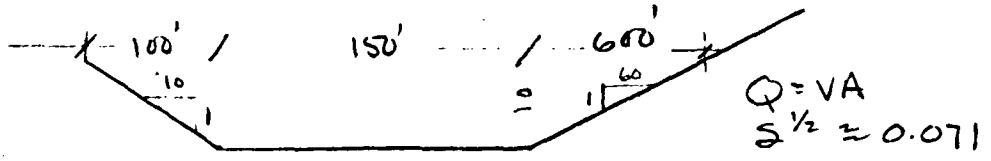
$$= 12,371 \text{ CFS}$$

$STAGE_3 = 8.5$ FT

∴ AT 3500' D/S, $STAGE_3 = 8.5$ FT
$Q_{p_3} = 12,371$ CFS

TRY ($REACH_3 = 1800'$) (5300' D/S) AT ROAD CROSSING

SECTION



H	A	P	$R^{2/3}$ (150')	$S^{1/2}$	1.486/n	
5	1625	500	2.19	0.071	10.61	2681
10	5000	851	3.26	"	"	12,279
15	10,125	1201	4.15	"	"	31,653
			D-12			

BY [illegible] DATE 5.9.79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 5 OF

CHKD. BY ____ DATE ____ INSPECTION OF DAMS PROJECT ____

SUBJECT PAILDEE ANALYSIS – No. GROSVENORDALE

FOR $Q_{P_3} = 12,371$ CFS USING S-D CURVE #3
$STAGE_3 = 10.0$ FT

STEP 4: ESTIMATE Q_{P_4}

$$A_3 = \frac{10 \times 10 \times 10}{2} + 150 \times 10 + \frac{60 \times 10 \times 10}{2}$$

$$= 500 + 1500 + 3000 = 5000 \text{ SF}$$

$$V_3 = \frac{1800' \times 5000}{43560} = 206.6 < 424 \text{ OK}$$

$$\text{TRIAL } Q_{P_4} = Q_{P_3}\left(1 - \frac{V_3}{S}\right) = 12,371\left(1 - \frac{207}{888}\right)$$

$$= 9,487 \text{ CFS}$$

$$\text{TRIAL } STAGE_4 = 9.0 \text{ FT}$$

$$A_4 = \frac{9.0 \times 10 \times 9.0}{2} + 9.0 \times 150 + \frac{9.0 \times 60 \times 9.0}{2}$$

$$= 405 + 1350 + 2430 = 4185 \text{ SF}$$

$$V_4 = \frac{4165 \times 1800}{43,560} = 173. \text{ AC-FT}$$

$$V_{AV.} = \frac{V_3 + V_4}{2} \quad \frac{206 + 173}{2} = 189.5 \text{ AC-FT}$$

$$Q_{P4} = Q_{P_3}\left(1 - \frac{V_{AV}}{S}\right) = 12,371\left(1 - \frac{189}{888}\right)$$

$$= 9738 \text{ CFS}$$

∴ AT 5300' D/S $Q_{P_4} = 9,738$ CFS.
$STAGE_4 = 9.1$ FT

TRY $L_{REACH_4} = 2500'$ - 7800' D/S - SECTION SIMILAR TO $REACH_2$ — USE FOR S-D CURVE

FOR $Q_{P_4} = 9738$ CFS
$STAGE_4 = 7.5$ FT

$$A_4 = \frac{7.5 \times 50 \times 7.5}{2} + 350 \times 7.5 + \frac{5 \times 7.5 \times 7.5}{2}$$
$$= 1406 + 2625 + 140 = 4171 \text{ SF}$$

$$V_4 = \frac{4171 \times 2500}{43,560} = 239 \text{ AC-FT} < 444 \text{ OK}$$

$$\text{TRIAL } Q_{P_5} = Q_{P_4}\left(1 - \frac{V_4}{5}\right) = 9738\left(1 - \frac{239}{888}\right) = 7,117 \text{ CFS}$$

TRIAL $STAGE_5 = 6.4$ FT

$$A_5 = \frac{6.4 \times 50 \times 6.4}{2} + 350 \times 6.4 + \frac{6.4 \times 5 \times 6.4}{2}$$
$$= 1024 + 2240 + 102.4 = 3366 \text{ SF}$$

$$V_5 = \frac{3366 \times 2500}{43,560} \quad 193 \text{ AC-FT}$$

$$V_{AV} = \frac{V_4 + V_5}{2} = \frac{239 + 193}{2} = 216 \text{ AC-FT}$$

$$Q_{P_5} = Q_{P_4}\left(1 - \frac{V_{AV}}{5}\right) = 9738\left(1 - \frac{216}{888}\right) = 7369 \text{ CFS}$$

∴ AT 7800' D/S - $Q_{P_5} = 7369$ CFS
$STAGE_5 = 6.5$ FT

BY RFB DATE 6/27/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1 OF
CHKD. BY DATE INSPECTION OF DAMS PROJECT
SUBJECT NORTH GROSVENORDALE - FAILURE ANALYSIS

FAILURE ANALYSIS #2 STRUCTUAL FAILURE AT DAM

ASSUME WATER ELEV. AT 376.0 - TOP OF ABUTMENT

WIDTH OF BREACH = 40% OF 200 FT = 80 FT.

$Q_{P1} = 8/27\, W_b \sqrt{g}\, Y_o^{3/2} + 60\% (6,022)$

$Q_{P1} = 1.68(80)(22)^{3/2} + 3619$

$Q_{P1} = 13,868 + 3619 = 17,487$ SAY 17,500 CFS

STORAGE CAPACITY @ EL. 376.0 = 890 AC.FT, S/2 = 445

USE SAME S-D CURVES AS PREVIOUS FAILURE ANALYSIS

STEP 4 ESTIMATE Q_{P2}, REACH = 1500 FT

STAGE = 16.2 FT A = 4480 V_1 = 154 ACRE.FT

$Q_{P2(TRIAL)} = 17,500\left(1 - \frac{154}{890}\right) = 17,500\,(1 - .173)$

$Q_{P2(TRIAL)} = 14,472$ CFS

STAGE = 14.8 A = 4000 V_1 = 138 ACRE.FT

$V_{AVE} = \frac{154 + 138}{2} = 146$ ACRE.FT

$Q_{P2} = 17,500\left(1 - \frac{146}{890}\right) = 17,500\,(1 - .164)$

$Q_{PE} = 14,630$ CFS

STAGE = 14.9 FT @ 1500 FT DOWNSTREAM

FOR REACH 2 = 2000 FT (3500 FT D/S)

FOR Q_{P2} = 14,630, STAGE = 9.3',

AREA = 5,600 SQ. FT V_1 = 257 ACRE-FT

Q_{P3} (TRIAL) = $14,630\left(1 - \frac{257}{890}\right) = 14,630\,(1 - .289)$

Q_{P3} (TRIAL) = 10,402 CFS

STAGE = 7.8 FT, A = 4,400 V_1 = 202 ACRE-FT

$V_{AVE} = \frac{257 + 202}{2} = 230$ ACRE-FT

$Q_{P3} = 14,620\left(1 - \frac{230}{890}\right) = 14,630\,(1 - .258)$

Q_{P3} = 10,855 CFS
STAGE = 8.0 FT @ 3500 FT DOWNSTREAM

FOR REACH 3 = 1800' (5300 FT D.S.) AT ROAD CROSSING

Q_{P3} = 10,855 CFS, STAGE = 9.5 FT,

AREA = 4,560 V_1 = 188 ACRE-FT

Q_{P4} (TRIAL) = $10,855\left(1 - \frac{188}{850}\right) = 10,855\,(1 - .211)$

Q_{P4} (TRIAL) = 8565 CFS

STAGE = 8.5 FT A = 3,720, V_1 = 154 ACRE-FT

$V_{AVE} = \frac{188 + 154}{2} = 171$ ACRE-FT

$Q_{P4} = 10,855\left(1 - \frac{171}{890}\right) = 10,855\left(1 - .192\right)$

$Q_{P4} = 8770$ CFS

STAGE = 8.6 FT @ 5300 FT DOWNSTREAM

REACH 4 = 2500 FT (7800 FT D.S.) SECTION SIMILIAR TO REACH 2 USE SAME CURVE

$Q_{P4} = 8770$ CFS, STAGE = 7.2 FT.

AREA = 3,920 $V_1 = 225$ ACRE-FT

$Q_{P5(TRIAL)} = 8,770\left(1 - \frac{225}{890}\right) = 8770\left(1 - .252\right)$

$Q_{P5(TRIAL)} = 6,560$ CFS

STAGE = 6.2 A = 3200, $V_2 = 184$ ACRE-FT

$V_{AVE} = \frac{225+184}{2} = 205$ ACRE-FT

$Q_{P5} = 8,700\left(1 - \frac{205}{890}\right) = 8,700\left(1 - .230\right)$

$Q_{P5} = 6,700$ CFS

STAGE = 6.3 FT @ 7800 FT DOWNSTREAM

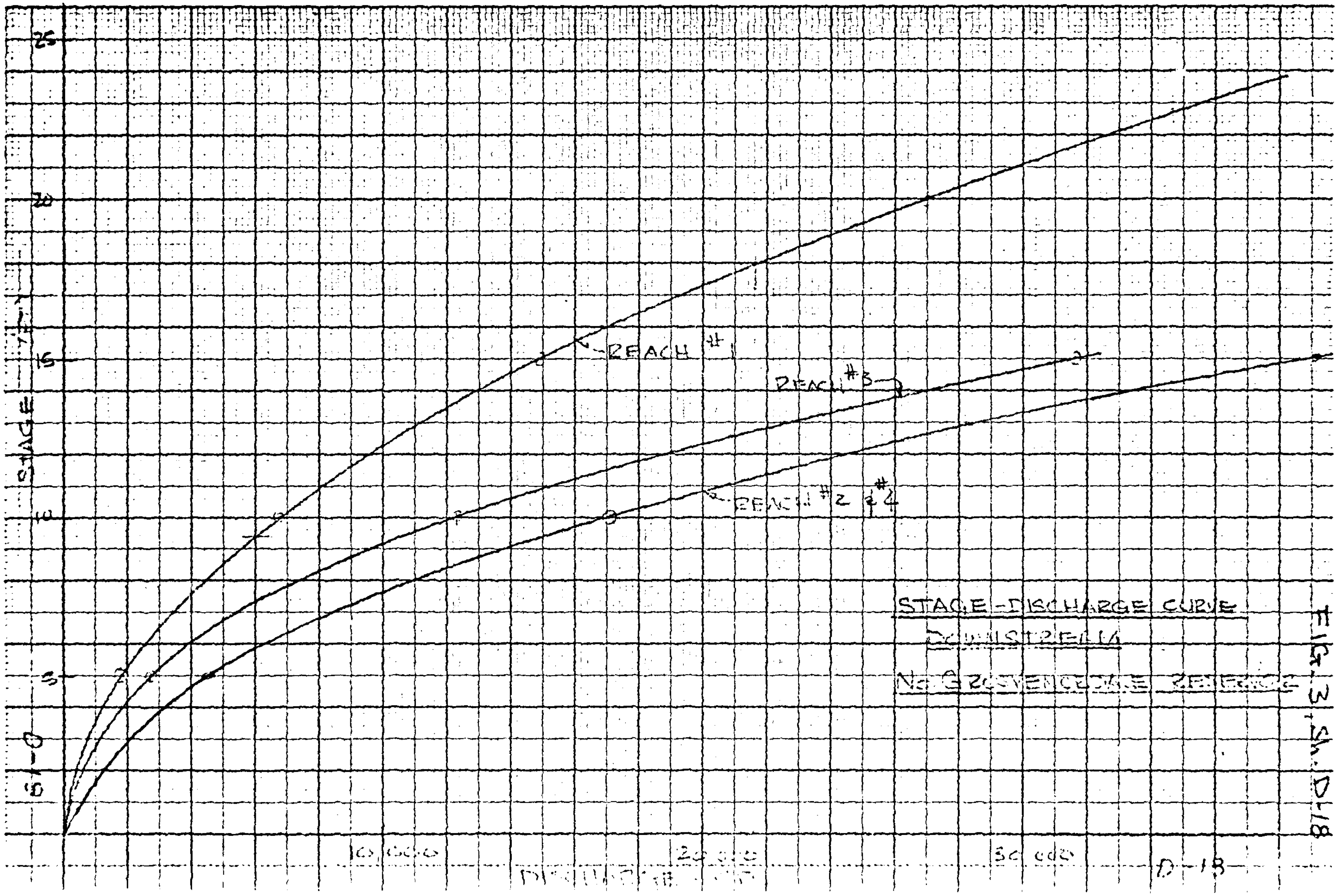

STAGE-DISCHARGE CURVE
REACH #1
REACH #3
REACH #2 & #4
25
20
15
10
5
0
STAGE
10,000
20,000
30,000
D-18

FIG. 3, Sh. D-18

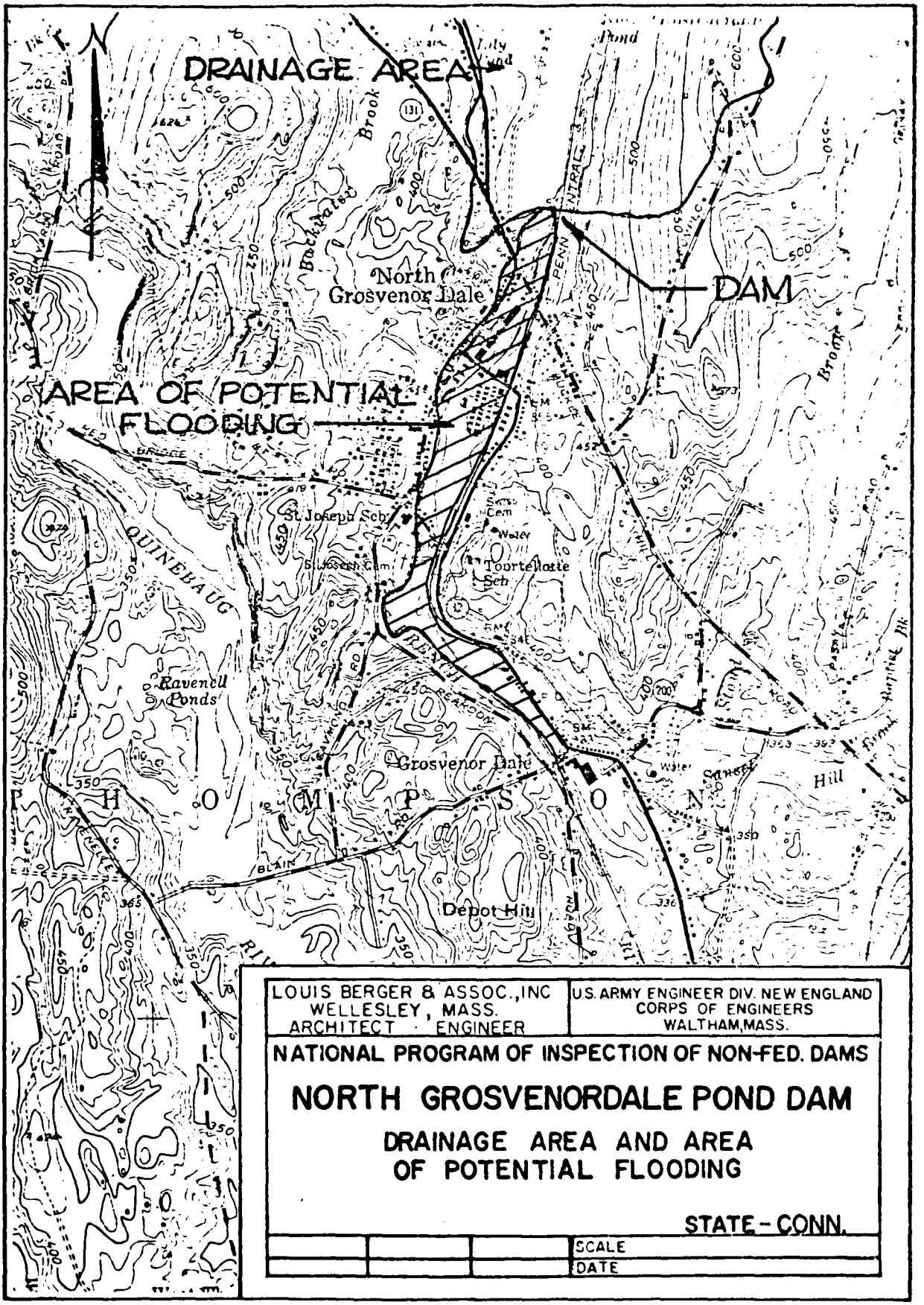
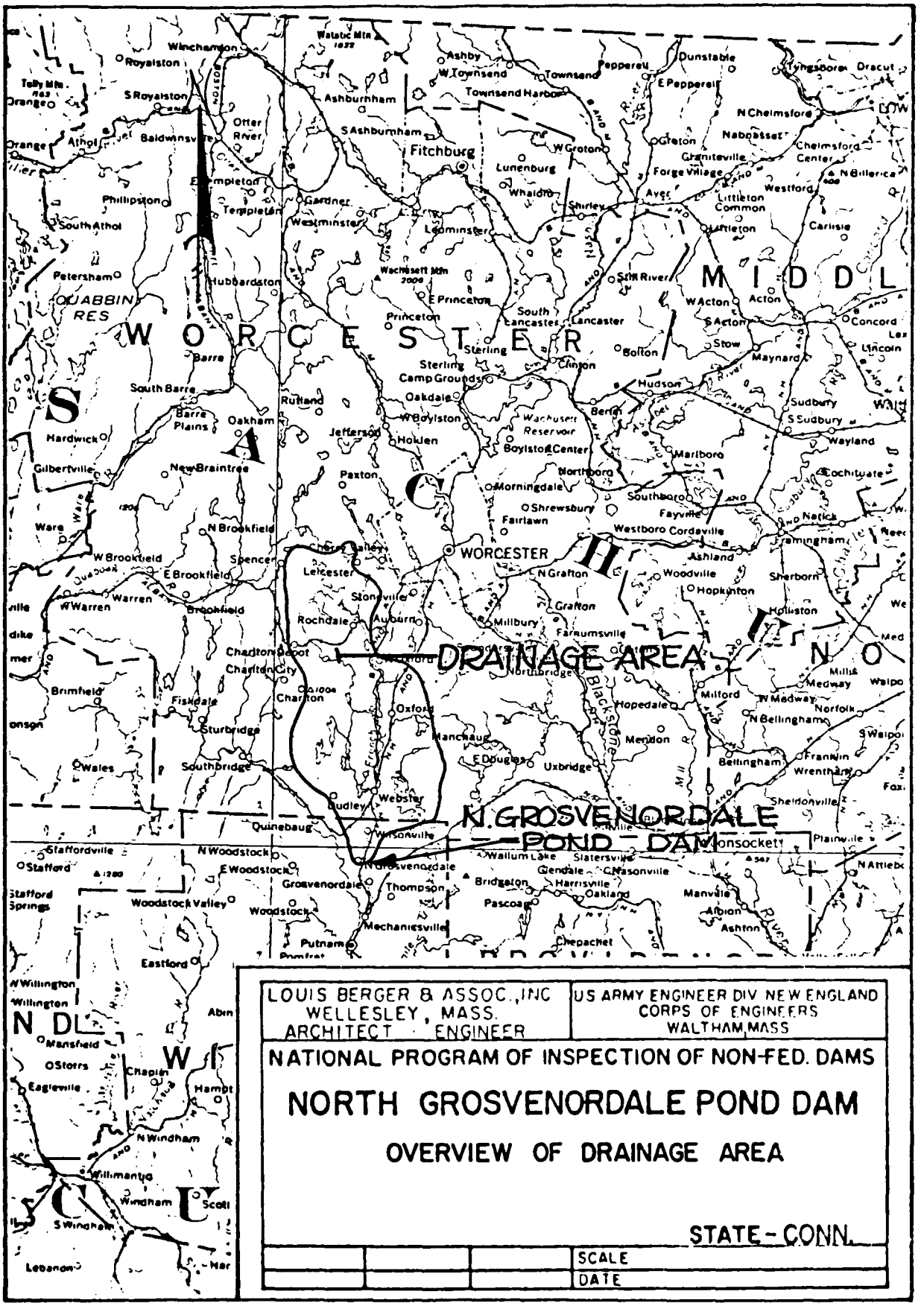


FIGURE 4 - PAGE 20



LOUIS BERGER & ASSOC., INC WELLESLEY, MASS. ARCHITECT - ENGINEER	US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

NORTH GROSVENORDALE POND DAM

OVERVIEW OF DRAINAGE AREA

STATE - CONN.

			SCALE
			DATE

FIGURE 5 - PAGE 21

Appendix E

Information as Contained in The National Inventory of Dams

INVENTORY OF DAMS IN THE UNITED STATES